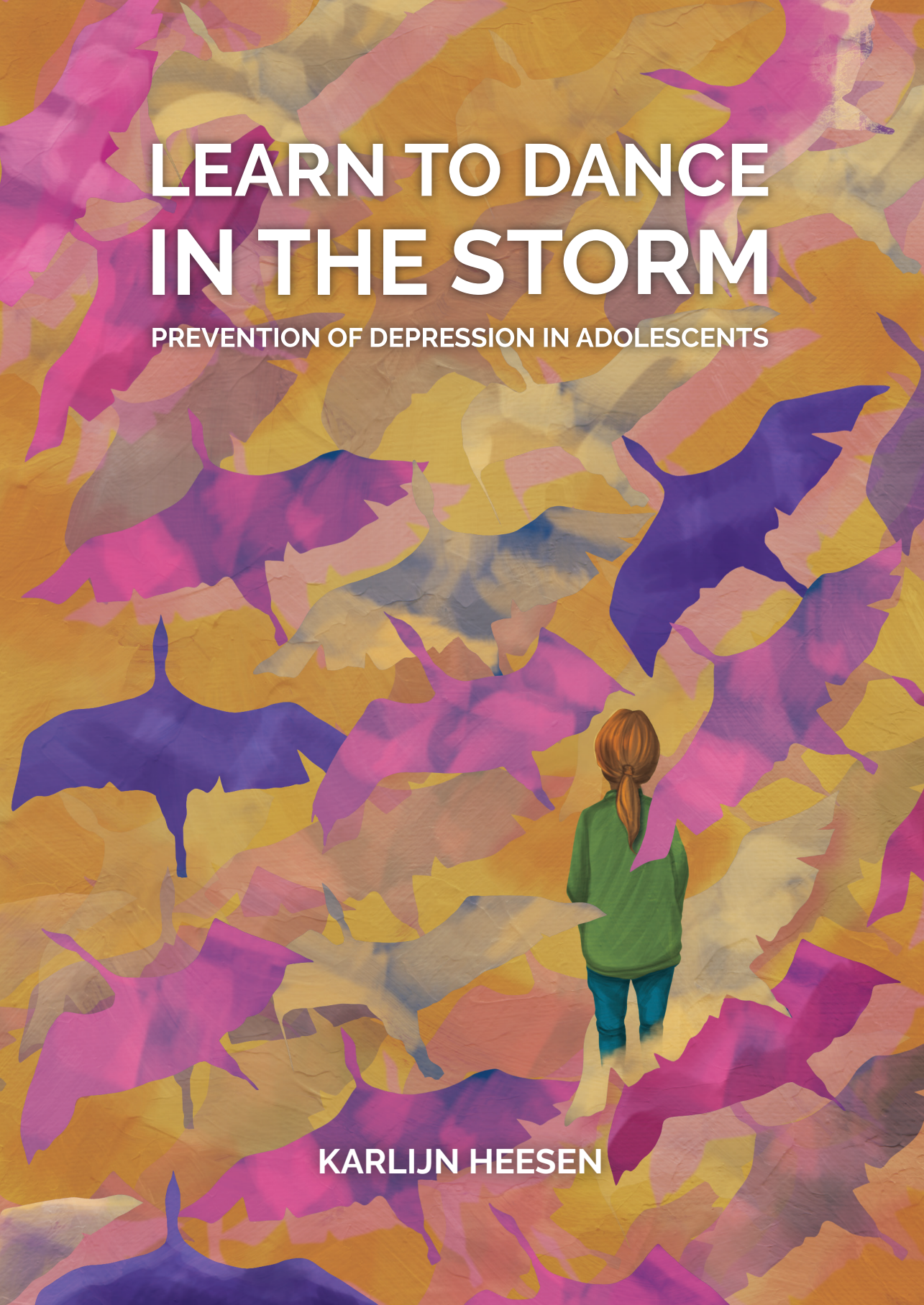
LEARN TO DANCE IN THE STORM

PREVENTION OF DEPRESSION IN ADOLESCENTS



KARLIJN HEESEN

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LEARN TO DANCE IN THE STORM

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Promotiecommissie

Promotoren:
Prof. Dr. R.C.M.E. Engels
Prof. Dr. R. Scholte

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Copromotoren:
Dr. S.P.A. Rasing
Dr. D.H.M. Creemers

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Chapter 1

General introduction

Prologue

Pim: *I was not very sad or depressed but most of the time I was irritated and felt angry. I resisted everything that I had to do, like doing homework or things that my parents asked me to do. All 'must dos" caused an oppositional reaction. This caused a lot of fights between me and my parents, starting in the eighth grade of primary school. The worst period was second grade in secondary school. Besides the arguing at home, my school performance declined and I missed contact with real friends. Sometimes I felt so frustrated that I yelled at my parents 'you wouldn't even miss me if I was dead'. It was not that I really wanted to end my life, it was just the heat of that moment. After a fight, I stomped upstairs to my bedroom, slammed the door and hid under my bed or a blanket, reading a book to calm down. I refused to eat with my parents and skipped dinner, with the result that I was very hungry the next morning and had to eat seven sandwiches. I could keep this behavior up for days, often until there was a funny moment where we all had to laugh.*

Real friends could have noticed that I was not doing great, but I had no really deep friendships at that time. I lived further away from school than most classmates, which made it more difficult to meet them after school. I gamed a lot and read fantasy/science fiction books. My school mentor knew that I was arguing a lot with my parents, but I had never had problems at school, so nobody knew how I really felt.

Parents of Pim: *Pim has always been an easy going child and, although he could be very social, he has always loved to be on his own. As a child, he liked to be outside and just strolling around. He is a creative thinker, always coming up with original solutions to a problem. However, he is also stubborn and draws his own plan. This caused a lot of trouble when puberty kicked in at the end of primary school. There were a lot of arguments about everything that he had to do, like going to school, for example. Once he was so upset that he rode away on his bike saying that he would never come back again. He went to family and just came back in the evening. The arguments got worse at secondary school, and there was at least one escalation a week, which drove us all mad. Pim made statements like 'I don't want to be here anymore'. We could understand that this was out of frustration, but it caused us a lot of worry. In addition to the arguments with Pim, we also had discussions as parents about how we could handle this situation best. We knew somewhere that this was a phase, but it was definitely not easy. We were stuck in a negative cycle.*

Why depression prevention in adolescents should be top priority

The story of Pim and his parents shows the instability of the early adolescence phase, which is characterized by cognitive maturation, and biological and social changes, a transition phase in which one is not a child neither an adult (Patton & Viner, 2007). The disturbance and confusion associated with this phase can provoke internal or external conflict. Although these conflicts provide the potential for growth and development, corresponding events and symptoms, such as conflicts with parents, insecurity, and mood disruptions make adolescents more vulnerable to symptoms of depression (Cicchetti & Rogosch, 2002). This vulnerability is reflected in depression rates that rise substantially in adolescence, with 12-month prevalence rates of around 5% in early adolescence and even up to 20% in late adolescence (Lewinsohn, Rohde, Klein, & Seeley, 1999). To compare, the lifetime prevalence rate in adulthood is estimated at 21% (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). In the Netherlands, the lifetime prevalence of a depressive disorder is 15.5% for adolescents between 11 and 19 years old. Of these adolescents, 48.2% experience severe depression (Ormel et al., 2015).

Depression, also known as major depressive disorder or clinical depression, is a serious mood disorder that negatively affects how you think, feel, and function in daily life, such as eating, sleeping, or working. The symptoms associated with depression are defined in two international classification systems: the International Classification of Diseases (ICD-10; World Health Organization, 2016) and the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association, 2013). Both classification systems characterize depression by two core symptoms, which are a depressed or irritable mood and a loss of interest or pleasure for at least two weeks. Depression varies from mild to severe, and besides the core symptoms it can include changes in appetite and eventual weight loss or gain, changes in psychomotor activity or restlessness, fatigue or loss of energy, insomnia or hypersomnia, diminished ability to think or concentrate, excessive feelings of guilt, worthlessness, or helplessness, and recurrent thoughts of death (which may include suicidal ideation, a suicide attempt, or a specific plan for committing suicide). A depressive disorder is diagnosed when one meets at least five symptoms, including one of the core symptoms, and the symptoms cause a significant burden to one's life (DSM-5).

Consequences of untreated depression

Because the symptoms of depression affect most parts of daily life, the consequences of depression can be immense for those individuals suffering. Given that adolescence is an important developmental phase in which new capacities and skills are learned (Sawyer, Azzopardi, Wickremarathne, & Patton, 2018), it is not surprising that the impact

of depressive symptoms is detrimental for adolescents. An increased risk of other mental health disorders, failure to complete secondary school, unemployment, loneliness, and interpersonal difficulties are some of the consequences that have been associated with an untreated depression in adolescence (Clayborne, Varin, & Colman, 2019; Fergusson & Woodward, 2002). Unfortunately, a depressive disorder or depressive symptoms in adolescence are often underdiagnosed and therefore untreated (Neufeld, Dunn, Jones, Croudace, & Goodyer, 2017). This is disturbing, as besides the negative consequences in the short term, the duration of an untreated depression has proved to be an important predictor of recurrence of depression in adulthood (Patton et al., 2014).

Many adolescents experience depressive symptoms but do not fulfill the criteria for a full-blown depression (Bertha & Balázs, 2013). For a long time, these symptoms were misinterpreted and seen as mood disturbances, part of the normal process of emotional maturation in this developmental phase (Patton et al., 2014). However, research has indicated that this 'moodiness' is an important risk factor for further distress, mental health disorders in early adulthood, and depression in adulthood (Aalto-Setälä, Marttunen, Tuulio-Henriksson, Poikolainen, & Lönnqvist, 2002; Bertha & Balázs, 2013; Pine, Cohen, Cohen, & Brook, 1999). Also, studies among adults teach us that most mental health disorders start in adolescence, between the ages of 11 and 18 years (Kessler, Berglund, et al., 2005). Therefore, adolescence can be seen as a vulnerable time for the start of depressive symptoms, wherein prevention should play a crucial role to prevent negative outcomes in the long term.

Depression and suicidality

Due to the high comorbidity rates and the tremendous impact on a person' life, it is almost impossible to ignore suicidality when contemplating depression. As in the case of Pim, suicidal thoughts could start out of frustration but they can evolve into preoccupation. Suicidality represents the whole suicidal process from wishing one were dead to thinking about suicide, considering it as an option, and, when worsened, making a specific plan to end life, which could be followed by an attempt or completion (Joiner, 2007; Klonsky, May, & Saffer, 2016). Depression includes suicidality as a possible symptom and is associated with an increased risk of suicidality (Nock et al., 2009). Suicidal ideation, which occurs at the beginning of the suicidal process, is especially highly related to depression, with prevalence rates between 25- and 50% in depressed young adults (Evans et al., 2017; Fergusson, Beautrais, & Horwood, 2003). In the general population, just like depressive symptoms, suicidal ideation rises dramatically in adolescence from less than 1% at the end of childhood to 17% at the end of adolescence (Nock et al., 2013). In the Netherlands, it is estimated that 11.2% of adolescents experience suicidal ideations (Dijkstra, 2010). Although suicidal ideations are an important predictor of a suicide attempt, most people

do not act on their thoughts, and it is estimated that one third of individuals suffering from suicidal ideations, in both clinical and non-clinical samples, continue to a suicide attempt (Fergusson et al., 2003; Nock et al., 2013).

Nevertheless, suicidality in adolescence is a global health concern, with suicide being the second leading cause of death in the United States and the leading cause of death in the Netherlands (CBS, 2018; WHO, 2018). Furthermore, it is estimated that for every suicide completion, 20 to 25 non-fatal attempts are made (Centers for Disease Control and Prevention, 2015). Although not fatal, the consequences of an attempt can be extensive and can include hospitalization, shame and personal suffering, and permanent injury. Needless to say, both attempts and completion of suicide have a tremendous impact on the environment, including the bereavement of family and friends and the fear of recurrence. Moreover, exposure to suicide can cause an increase in suicidal ideation, attempt or dying by suicide in individuals, and adolescents in particular are sensitive to this contagion effect (Swanson & Colman, 2013). Because of this impact and the high comorbidity between suicidality and depressive symptoms, it is important that attention is given to suicidality in the process of depression prevention.

Depression: Causes and treatment

Although depression is seen as one consistent disorder, it is highly heterogeneous in its expression and the etiology. Cognitive models that explain how depression develops are mostly based on the diathesis-stress model, which indicates that depression is a result of the interaction between cognitive vulnerability, the diathesis, and the stress caused by the life experiences (Clark, Beck, & Alford, 1999; Lakdawalla, Hankin, & Mermelstein, 2007). The diathesis-stress model helps to understand the interplay between nature and nurture, and assumes that depression develops when the combination of biological vulnerabilities and stressors passes a threshold. The most prominent theories based on this model are the cognitive theory of Beck (1964) and the hopelessness theory (Abramson, Metalsky, & Alloy, 1989).

The cognitive theory of Beck (1964) states that depressive symptoms might emerge when stressors involving loss occur and activate automatic and negative thoughts about the self, the environment, and the future. These negative thoughts and beliefs are generated by underlying maladaptive cognitive structures that are developed in interaction between individual vulnerabilities and life stressors. An example of such an assumption is ‘I am a failure’. When facing stress, this negative self-schema ensures that ambiguous situations are interpreted in a negative way. Beck referred to this as

cognitive distortion—for example, overgeneralizing (drawing a conclusion about the self, based on a single event) or selective abstraction (drawing a negative conclusion without evidence, or evidence that opposes the conclusion). The hopelessness theory of depression explains that depressive symptoms arise through the assumption that successful outcomes are attributed to external and specific unstable factors (e.g., 'I passed the exam because it was too easy'), and aversive outcomes to internal, global, and stable factors (e.g., 'I failed the exam because I am too dumb'). The external locus of control that negative events will happen and the attitude of helplessness that there is nothing to do about it, in combination with negative life events, will make individuals vulnerable to the development of depression (Abramson et al., 1989).

Research suggests that both theoretical frameworks provide a better understanding of the sensitivity in adolescence to the development of depression (Jacobs, Reinecke, Gollan, & Kane, 2008; Pössel & Smith, 2020). Maladaptive cognitions begin to form in childhood as a response to the environment (e.g., 'most people are not honest'). However, these negative attributions are not yet stable and therefore may not have the negative impact described in the hopelessness theory. Attributions evolves in adolescence as a consequence of the major changes in cognitive development, including: tremendous brain maturation, an increase in speed of processing, more self-directed thinking, and greater executive control. The combination of these cognitive development changes allows negative attributions to develop into vulnerabilities for depression (Carter & Garber, 2011; Cohen, Young, & Abela, 2012; Cole et al., 2008). The interaction of this stabilized negative attribution style with life stress produces depressive symptoms (Gibb & Alloy, 2006).

Based on these theories, cognitive behavioral therapy (CBT) aims to modify negative attributions and has been shown to be effective in treating depressive symptoms in adolescents (Oud et al., 2019). The treatment focuses on the identification of dysfunctional thoughts and replaces these with more helpful thoughts by evaluating the validity of negative assumptions and distortions (Beck, 1967). Currently, CBT is the first choice of treatment for adolescents with depressive symptoms or disorders (National Institute for Health and Care Excellence [NICE], 2019; Oud et al., 2019; Trimbos-Institute, 2009). Moreover, CBT is suitable for the treatment of mild symptoms of depression as these symptoms are caused by the same cognitive processes underlying depression, and therefore forming a sufficient basis for the development of depression prevention programs (Hetrick, Cox, Witt, Bir, & Merry, 2016).

Risk factors

In addition to the cognitive models, research has established several risk factors that make one more vulnerable to the development of depression. One of the strongest biological risk factors for depression is gender, with a twofold greater prevalence in females. This difference in prevalence starts at the age of 13, around the onset of puberty (Hyde, Mezulis, & Abramson, 2008). Although it seems that depressive symptoms are related to female hormone changes, the gender difference is not yet fully understood (Albert, 2015). Another important biological risk factor is having a genetic predisposition to depression. Studies of twins show that the heritability rates of offspring of parents that are known to have depression lie between 30- and 50% in late adolescents (Thapar & Rice, 2006). This risk factor can directly predispose one to depression, or indirectly, through psychological factors such as coping style or temperament, which make one more vulnerable to depression. In addition to hormonal changes in puberty, a genetic predisposition to depression can increase the sensibility to stressful events (Thapar, Collishaw, Pine, & Thapar, 2012). Although these are examples of how risk factors interact in a negative way, they also endorse the importance of prevention to protect adolescents at high risk of developing depression.

Besides biological risk factors there are many factors that have been the subject of research on an individual or social level. One of the most relevant predictors of depression is childhood trauma, especially abuse or neglect (Kwong et al., 2019; Lu, 2019). The negative impact increases in adolescents who have experienced multiple negative life events, or when the events have a chronic and/or severe character (Lewinsohn, Allen, Seeley, & Gotlib, 1999). Negative life-events such as bereavement or a physical illness, are not necessarily related to depression. However, adolescents who are genetically predisposed to depression seem more sensitive to the negative effect of such events (Starr, Hammen, Brennan, & Najman, 2013).

The risk factors discussed so far are often unavoidable realistically, and therefore hard to prevent. From this perspective, it is necessary to examine risk factors that have a prominent role in adolescence and can be modified in order to prevent the onset of depression. Therefore, this dissertation will highlight coping and perfectionism in relation to depressive symptoms and suicidality. Both factors are likely to expand in early adolescence, and therefore prevention programs can benefit from studies that investigate coping and perfectionism in relation to depressive symptoms. Also, there is a need for empirical studies to examine coping and perfectionism in the process of suicidality, especially in this young age group. Coping and perfectionism are both hypothesized as vulnerabilities that may confer an increased risk of the development of suicidal ideations, but evidence in this age group is lacking (O'Connor & Kirtley, 2018). We will discuss both coping and perfectionism in further detail.

Coping

Coping can be defined as the behavior and thoughts one uses to manage internal and external stress (Folkman & Moskowitz, 2004). The development of coping starts at a very young age; children seek support from adults or use overt behavior, such as outburst or avoidance, in reaction to stressful situations (Zimmer-Gembeck & Skinner, 2011). As children grow older, they acquire more advanced strategies to cope with stress, and strategies shift from primitive reactions, such as self-soothing techniques, to more cognitive strategies, such as problem-solving. Due to the maturation of cognitive skills during adolescence, the possibility of using different coping strategies increases as adolescents' ability to reflect on the utility of these strategies increases (Aldwin, 2007). When adolescents reach the age of 15–18 years, they already have a broad range of coping strategies and use adaptive coping strategies more often in response to stressful events (Donaldson, Prinstein, Danovsky, & Spirito, 2000; Seiffge-Krenke, 2000).

Yet some adolescents have difficulties with their response to stressful events and experience increased stress levels, which may eventually cause depressive symptoms (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Compas, Orosan, & Grant, 1993; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Also, under conditions of stress, individuals in general are more likely to use less effective strategies to cope with stress, leading to more symptoms of psychopathology (Jaser et al., 2008). Large individual differences exist in the way adolescents handle events and stressors, and it has been suggested that the use of certain coping strategies is related to greater vulnerability to developing depressive symptoms in response to these stressors (Garnefski, Legerstee, Kraaij, van Den Kommer, & Teerds, 2002). For example, seeking distractive activities (e.g., gaming) in order to disengage from the source of stress is related to more symptoms of depression (Aldao et al., 2010; Wadsworth & Compas, 2002). This kind of information is very beneficial in the development of depression prevention programs as it shows which strategies are helpful to cope with stress and which are not.

Perfectionism

Perfectionism is a multidimensional construct with two underlying factors: personal standards perfectionism and concerns about mistakes and doubts perfectionism. Although there are several synonyms for these factors, they represent the same thing. Personal standards perfectionism includes self-oriented perfectionism (demanding perfectionism of the self; Hewitt & Flett, 1991) which is manifested by striving for perfection and excellence. Concerns about mistakes and doubts perfectionism includes socially prescribed perfectionism (perceiving others as demanding perfectionism; Hewitt & Flett, 1991) which is manifested by extreme reactions to perceived errors and uncertainties about performance abilities (Frost, Marten, Lahart, & Rosenblate, 1990). Both personal standards and concerns about mistakes

and doubts perfectionism have positive associations with depressive symptoms in clinical and non-clinical samples, and both predict an increase in depressive symptoms in the long term (for a review, see Limburg, Watson, Hagger, & Egan, 2017).

Perfectionism is a trait that is most likely to start to develop in adolescence (Stoeber & Childs, 2011). Increased awareness of the self and social standards in this phase in combination with a school environment in which evaluation and competition are encouraged provide a setting in which perfectionism can be developed or increased (Damian, Stoeber, Negru-Subtirica, & Băban, 2017). When perfectionism reaches a level at which it becomes unhealthy (e.g., excessive preoccupation with past mistakes or extreme concern about the expectations of others), it can cause depressive symptoms. This underlying mechanism of the perfectionism-depression link is described by the perfectionism social disconnection model (PSDM) of Hewitt, Flett, Sherry, and Caelian (2006) whose validity in adolescence is proven (Ko, 2019; Magson, Oar, Fardouly, Johnco, & Rapee, 2019). This model states that perfectionists have difficulty participating in interpersonal relationships, and the feeling of disconnection exacerbates depressive symptoms.

Besides the associations between perfectionism and depression, elevated perfectionism is also related to poorer outcomes when adolescents are treated for depression. Sensitivity about rejection could lead to a hesitation to disclose information or a tendency to behave in a way that ensures social disconnection from the therapist (Hewitt, Smith, et al., 2020). This might have important implications for clinical practice, as prevention and intervention strategies that focus on a reduction in depressive symptoms in perfectionistic adolescents may cause poorer treatment outcomes and increase the chance of a relapse. More research is needed on this topic in this young age group, however, to explore the implications of unhealthy traits of perfectionism for prevention and intervention. The current dissertation will add to the body of literature by examining perfectionism and coping in relation to depressive symptoms and suicidality in order to provide understanding of the development of symptoms which might give rise to improved prevention programs.

Prevention and health promotion

Considering the short- and long-term consequences of depressive symptomatology and subsequent disorder, depression prevention is an important priority. Research in the prevention field has expanded in the last ten years and is now at a level where we know that prevention has the potential to diminish the burden of depression (Cuijpers, Beekman, & Reynolds, 2012; Hetrick, Cox, & Merry, 2015; Hetrick et al., 2016; Ssegonja et al., 2019; Werner-Seidler, Perry, Calear, Newby, & Christensen, 2017). The next step is to examine

preventive strategies when they are fully implemented in the (school) community. This makes it possible to test whether the effectiveness of prevention programs remains under real life circumstances.

Building on the knowledge in past research, we have gained insight into what works in prevention and what does not. Generally, prevention programs are organized on three levels: 1) universal prevention, which is aimed at all individuals in a general population; 2) selective prevention, which is aimed at the population with an increased risk for developing symptoms; and 3) indicated prevention, which is aimed at individuals who are already experiencing depressive symptoms (Muñoz, Cuijpers, Smit, Barrera, & Leykin, 2010). Of these three prevention levels, indicated depression prevention has proved to be the most effective (Hetrick et al., 2015; Horowitz & Garber, 2006; Ssegonja et al., 2019; Stockings et al., 2016).

However, the effect sizes vary over different trials, and this is one of the reasons for several meta-analyses to examine potential moderators of the programs. Group-based interventions based on CBT and interpersonal psychotherapy (IPT) are the most extensively investigated and show the largest effect sizes. In addition, the effects of group trainings given by a psychologist were superior to those given by school staff (Werner-Seidler et al., 2017), possibly because they have more training and experience with the delivery of interventions (Stice, Shaw, Bohon, Marti, & Rohde, 2009). Also, shorter programs (less than 12 hours) had larger effects than longer prevention programs, probably because they are more appealing to adolescents and prevent drop-out. Furthermore, the inclusion of homework assignments ensured greater effects, which may be due to the additional practice in real world situations (Stice et al., 2009). Finally, research suggests that efficacy was greater when programs were delivered to children or early adolescents than when delivered to older adolescents and should take place before the onset of clinical disorders (Cuijpers, van Straten, Smit, Mihalopoulos, & Beekman, 2008; Werner-Seidler et al., 2017). Based on these findings, depression prevention programs for adolescent populations have been developed across the globe and thoroughly tested in order to maximize their efficacy.

Preventive intervention: Op Volle Kracht

Op Volle Kracht (OVK) is a depression prevention program in the Netherlands that is well-examined and has proven its efficacy. The program is based on the Penn Resiliency Program (PRP; Gillham, Reivich, Freres, Chaplin, Shatté, et al., 2007), which proved to be effective in reducing depressive symptoms in adolescents (Brunwasser, Gillham, & Kim, 2009). PRP is largely based on CBT, including cognitive restructuring and social problem solving, and the training is given in a school setting. In 2011, PRP was translated and adapted to the Dutch culture, resulting in a prevention program of

16 lessons in which the first eight lessons were focused on CBT and the second eight lessons on coping and social skills (Tak et al., 2012). In contrast to the effectiveness of PRP, OVK was not effective in reducing depressive symptoms on a universal or selected level (Kindt, Kleinjan, Janssens, & Scholte, 2014; Tak, Lichtwarck-Aschoff, Gillham, Van Zundert, & Engels, 2016). However, OVK was effective in reducing depressive symptoms in a sample of adolescent girls with elevated depressive symptoms, when the program was shortened to only the first eight lessons (Wijnhoven, Creemers, Vermulst, Scholte, & Engels, 2014).

In addition to OVK and PRP, several prevention programs have been shown to be effective in reducing depressive symptoms. According to a review by Brunwasser and Garber (2016), the following programs are investigated in multiple randomized controlled trials (RCT's), in realistic settings, and have been effective in the reduction of depressive symptoms relative to control groups: Aussie Optimism Program (Roberts, 2006), Bibliotherapy (Burns, 1989; Stice, Burton, Bearman, & Rohde, 2007), Blues Group (Stice et al., 2007), Coping with Stress Course (CwSC; Clarke et al., 1995), FRIENDS (Barrett, 2005), Interpersonal Psychotherapy-Adolescent Skills Training (Young, Mufson, & Gallop, 2010), and LARS & LISA (Pössel, Horn, Groen, & Hautzinger, 2004). Most of these programs are CBT-based, and aside from the Aussie Optimism Program and LARS & LISA, the programs were examined in indicated prevention trials. Five of these programs—PRP, CwSC, Blues Group, Bibliotherapy, and FRIENDS—revealed main effects at least one-year post intervention. In addition, CwSC and Blues Group proved to be effective in the prevention of depressive episodes. Table 1 provides an overview of the content of the prevention programs above.

Regardless of these positive findings, the focus of researchers so far has been more on efficacy than on effectiveness. By examining the efficacy, researchers provide the most ideal circumstances to examine prevention effects and are closely involved in the execution of the prevention program. Effectiveness studies answers the question of whether a program works under real life circumstances. So, despite the efficacy of programs, there is a need for programs that are fully integrated in schools and communities to examine the effects under real life circumstances and with as little involvement as possible of the program developers (Brunwasser & Garber, 2016; Werner-Seidler et al., 2017). This way, it can be examined whether effects remain when implemented under real life circumstances.

Additionally, in order to improve implementation, researchers and practitioners need to address some important issues. Firstly, for participation in most of the programs, adolescents need to be motivated and take the initiative to engage in programs or to

enroll in health care settings. Considering that it is estimated that only one third of the adolescents with depressive symptoms actively search for help in the first year that symptoms arise (Raven, Jörg, Visser, Oldehinkel, & Schoevers, 2017), the question is whether these programs reach their goals in the actual prevention of symptoms. Actively screening for depressive symptoms could solve this; however, screening for symptoms could give rise to other implementation issues, such as costs and extra work. Another problematic issue is the many barriers for implementation itself such as poor financing and a non-supportive political atmosphere (Mallonee, Fowler, & Istre, 2006). The implementation of prevention programs with the purpose to evaluate their effectiveness is often very ad hoc, and there is no continuity when the researchers or program developers leave. To cope with the challenge of sustainable implementation, there is a need for a holistic collaborative prevention approach that bridges the gap between science and practice.

Collaborative care

Considering the challenges for implementation, collaborative care might provide a setting in which implementation can be facilitated. The collaborative care model has grown in popularity in several primary care settings and tries to address these issues. Collaborative care is based on the principles of chronic disease management and has frequently been applied to depression among adults in primary care settings, mainly in the US. Collaborative care can include many interventions, but the core ingredient is an active approach—for instance, by screening and monitoring symptoms. Key elements of collaborative care are a multi-professional approach to patient care, enhanced interprofessional communication, focusing on a defined population, the use of outcome measures to drive clinical decision-making, and evidence-based working (Gunn, Diggens, Hegarty, & Blashki, 2006). It encourages professionals to work together and break down the barriers that are often part of health care systems (Archer et al., 2012).

Research has shown that collaborative care is effective in reducing depressive symptoms in primary care settings for adults (Archer et al., 2012; Gilbody, Bower, Fletcher, Richards, & Sutton, 2006) and, although there has been limited investigation, for adolescents (Richardson et al., 2014; Shippee et al., 2018). Several recent meta-analyses make it clear that collaborative care leads to better patient outcomes, reductions in health costs, and better patient and provider satisfaction (Archer et al., 2012; Coventry et al., 2014). According to the clinical guidelines for the treatment of depression, collaboration is essential to ensure timely and effective access to the help needed, and prevention settings could therefore also benefit from collaborative care (NICE, 2019; Trimbos-Institute, 2009; US Preventive Services Task Force, 2009). This dissertation will focus on a collaborative care approach to depression prevention.

STORM

So far, we have discussed the importance of depression prevention in adolescence and the challenges for implementation. In an attempt to deal with these challenges, we started the Strong Teens & Resilient Minds (STORM) approach, which is a collaborative care approach to depression prevention. This project started in 2015, in the southeast Netherlands, based on the need for depression prevention and the encouraging empirical findings of Wijnhoven et al. (2014) indicating that screening and providing OVK in a shortened version to adolescent with elevated depressive symptoms could be a promising strategy to prevent depression. Besides the clear need for a prevention strategy, it was obvious that ad hoc implementation of a prevention program would not be sufficient to gain sustainable results. Therefore, an extensive collaboration was started in the southern Netherlands between the public health care services (in Dutch GGD), schools, community workers, caregivers within or connected to the schools, and specialized mental health care organizations. The project was funded by the municipality of Oss and was also supported by universities in order to evaluate its effectiveness.

We aimed to implement a collaborative care prevention approach including: 1) annual screening of all students in the second grade of secondary school (12–15 years) for depressive symptoms and suicidal ideation, where students with acute suicidality were directly referred for treatment; and 2) providing a CBT prevention program to adolescents with elevated depressive symptoms. The uniqueness of this strategy is the fact that all participating organizations have their own tasks and fulfill their own place in a network of collaborative preventive care. Public health services are responsible for screening, interviewing, and referral; a licensed psychologist connected to the school provides the prevention program together with a mental health caregiver; the specialized mental health care organization supports the process by sharing expertise and providing training in interviewing for suicidality and delivery of the CBT prevention program; and the universities provided the facilities to examine the effectiveness.

Table 1
Overview of Main Evidence-Based Indicated-Depression Prevention Programs for Adolescents

Program	County	Theory	Content
Aussie Optimism Program (Roberts, 2006)	Australia	CBT	Optimistic thinking skills and social life skills.
Bibliotherapy (Burns, 1989; Stice et al., 2007)	USA	CBT	Self-help book: Feeling good. Explanation of CBT principles and exercises to improve communication.
Blues Group (Stice et al., 2007)	USA	CBT	Cognitive restructuring techniques and planning response plans to future life stressors.
Coping with Stress Course (CwSC; Clarke et al., 1995)	USA	CBT	Cognitive restructuring techniques to promote adaptive coping.
FRIENDS (Barrett, 2005)	Australia	CBT, acceptance commitment therapy, positive psychology	Techniques to regulate emotions, thoughts, and behaviors.
Interpersonal Psychotherapy-Adolescent Skills Training (Young et al., 2010)	USA	IPT	Psycho-education, communication and interpersonal problem-solving skills to improve relationships.
LARS & LISA (Pössel et al., 2004)	Germany	CBT	Identifying maladaptive thought patterns and behaviors and replacing with more realistic alternatives.
Penn Resiliency Program (Gillham et al., 2007)	USA	CBT	Cognitive restructuring techniques and a variety of techniques to solve problems and cope with difficult situations, such as assertiveness and relaxation.

	Selection	Age range	Number of sessions	Setting
	Universal	11–13 years Adapted program for children aged 9–10 years	10 lessons	School
	Universal, targeted, indicated	No specific age range	-	Individual
	Indicated and targeted	15–18 years	6 x 1-hour group sessions	School
	Indicated	13–18 years	15 x 45-minute group sessions	School
	Universal and indicated	4–15 years	10 x 70-minute sessions and 4 sessions for parents (flexible across settings)	School or clinical practice
	Indicated	12–16 years	2 x individual sessions and 8 x 90-minute group sessions	School
	Universal	13–14 years	10 x 90-minute sessions	School
	Universal, selected, and indicated	9–14 years	12 x 90 minute sessions	School

Based on Wijnhoven et al. (2014), we updated the OVK program and shortened the program from 16 to eight lessons, which were solely based on the CBT techniques. We added some multimedia tools to make the program more attractive. For example, we include an interactive quiz and some videos as an introduction to a new lesson. In addition, we include homework assignments based on positive psychology and mood monitoring. Also, adolescents have the option to do their homework online, through an app, or on paper. This also applies to the mood monitoring. Moreover, we interviewed the trainers beforehand and, based on these conversations, we included an introductory meeting between the participant and the trainers, an informative meeting for parents and participants about the program, an optional booster session three months after the training, and optional energizing exercises that trainers could use during the lessons to keep adolescents motivated. We summarize the content of each session of OVK 2.0 in Table A in the Appendix. This program was used in our prevention approach in order to decrease depressive symptoms in adolescents who were already experiencing elevated depressive symptoms. For study purposes, we compared OVK 2.0 with psycho-education to examine which intervention would be more effective in the prevention of depression.

Overview of the dissertation

The aim of the current dissertation was to examine the risk factors related to depressive symptoms and suicidality and to test the effectiveness of a collaborative care approach to indicated depression prevention in adolescents. Chapter 2, presents a study of the longitudinal bidirectional associations between coping and depressive symptoms in a large sample in a general population of adolescents. In addition, we test whether gender is associated with a difference in the association between coping and depressive symptoms. In Chapter 3, the results of a cross-sectional study are presented in which the association between perfectionism and suicidality is examined, together with the moderating role of cognitive coping. The data used for this study represent a general population of adolescents. Chapter 4 consists of the study protocol of the RCT testing the effectiveness of implemented depression prevention in high-risk adolescents. The main results of this prevention strategy are presented in Chapter 5. We compare the effects of OVK 2.0 and psycho-education on the reduction of adolescent- and parent-rated depressive symptoms, and remission status of clinical depression. In Chapter 6, we test the effect of implemented depression prevention in high-risk adolescents on secondary outcomes anxiety, somatic complaints, suicidality, and perfectionism. Finally, Chapter 7 offers a summary of the findings and a general discussion, including clinical implications and recommendations for future research.

Chapter 2

Associations between coping strategies and depressive symptoms in adolescence: A longitudinal perspective

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Abstract

Adolescent depression is a major concern for public health and is associated with negative consequences and outcomes. Identifying adolescent characteristics that might relate to the risk for developing depression is crucial. This study investigated bidirectional associations between coping strategies and depressive symptoms over time. The participants were 1,341 secondary school students from the Netherlands (*M* = 13.91, *SD* = 0.55, 47,5% girls) who completed self-report questionnaires at six waves over 2.5 years. Cross-lagged models were used to investigate the associations between coping strategies and depressive symptoms. Coping strategies did not predict depressive symptoms over time. However, there was an indication of the reverse relationship. When adolescents experienced elevated depressive symptoms, they used fewer adaptive techniques to target stress. Gender differences were found in the use of avoidance. The inconsistencies of these findings with earlier studies are discussed and provide new directions for future research on working mechanisms underlying depression prevention programs.

Introduction

Adolescent depression is a major concern for public health, as clinical and subclinical depression rates show a sharp increase in this critical developmental period (Kessler et al., 2012; Reef, Diamantopoulou, Van Meurs, Verhulst, & Van Der Ende, 2009). Most depressed adults experienced their first depressive disorder in adolescence, with the period between 13 and 18 years of age being the most critical time for the onset of depression (Kessler, Berglund, et al., 2005b; Kim-Cohen et al., 2003). International epidemiological studies have shown that 2.7% of the 8- to 15-year-old adolescents and 7.5% of the 13- to18-year-old adolescents experience depression (Avenevoli, Swendsen, He, Burstein, & Merikangas, 2015; Merikangas et al., 2010). Although the depression rates are already concerning, a depressed mood and elevated symptoms of depression are not included in these rates and even more common in adolescence, with prevalence rates of 20% in the adolescent population (Meijer, Smit, Schoemaker, & Cuijpers, 2006).

There are several risk factors that are known to be associated with depression in adolescence, such as individual characteristics (e.g., perfectionism), social and family processes (e.g., abuse or bullying), or the presence of a psychiatric disorder. Gender has also proved to be an evident risk factor for the development of depression. Depressive symptoms among boys are relatively stable across adolescence, whereas girls report a significant increase in depressive symptoms from the age of 13 (Avenevoli et al., 2015; Costello, Swendsen, Rose, & Dierker, 2008).

Besides these, mostly stable risk factors, another factor that is related to the development of depressive symptoms is coping. Substantial individual differences exist in the ways in which adolescents handle events and stressors, and it has been suggested that the use of certain coping strategies is related to greater vulnerability of developing depressive symptoms in response to stressors (Garnefski, Legerstee, et al., 2002). Therefore, most depression prevention programs include techniques to enhance coping skills and help adolescents cope with negative thoughts and feelings (Gillham, Reivich, Freres, Chaplin, Shatté, et al., 2007). However, these programs show small effect sizes (Merry, Hetrick, et al., 2012; Stice et al., 2009), and there is limited evidence as to whether the techniques included are effective for the prevention of depressive symptoms. To further our understanding of the association between coping and depressive symptoms, the present study investigated whether specific coping strategies are associated with levels of depressive symptoms over time among adolescents.

Coping Strategies

Coping can be defined as 'conscious volitional efforts to regulate emotion, cognition, behavior, physiology, and the environment in response to stressful events or circumstances' (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). Several theorists have studied coping strategies of adolescents, arguing that adolescents who have difficulties with their emotional response to daily stressors experience more severe stress, which may ultimately lead to depression (Aldao et al., 2010; Compas et al., 1993; Nolen-Hoeksema et al., 2008). Active coping strategies (e.g., problem solving) seem to provide a buffering effect, while strategies that involve disengagement from the source of stress put adolescents at risk for developing depressive symptoms (Aldao et al., 2010; Compas et al., 2001; Garnefski, Boon, & Kraaij, 2003; Wadsworth & Compas, 2002).

This was also confirmed in a recent meta-analysis among adolescents, conducted by Schäfer et al. (2017), which indicated that avoidance and distraction were related to more depressive symptoms, whereas problem focusing and positive cognitive reframing were related to less depressive symptoms. Nevertheless, there are coping strategies that show mixed findings in relation to psychopathology. For example, social support was found to be unrelated to psychopathology according to a meta-analysis by Compas et al. (2017) but was associated with depressive symptoms in a meta-analysis by Rueger et al. (2016). This might be an example of a strategy that can be effective depending on an individual's age. Social support might be adaptive for an early adolescent in the regulation of emotions, but it might be maladaptive for the mid-adolescent when it leads to co-rumination (Compas et al., 2017; Stone, Hankin, Gibb, & Abela, 2011). Therefore, researchers should allow for developmental effects, for example by using longitudinal designs.

Longitudinal designs are especially important in this age group as strategies to cope with stress are not yet stable, and change might occur. Earlier research in the coping area showed that coping strategies increase with age in both number and variety. For example, older adolescents (14–18 year olds) tend to use more emotion regulation strategies, like relaxation or distraction compared to younger adolescents (Donaldson et al., 2000). Moreover, developmental shifts ensure that adolescents start to use social partners to cope with stress, experience an increased ability to use cognitively complex processes, and change from more overt behavior (e.g., crying or yelling) to less overt strategies like distraction (Thompson & Goodman, 2010; Zimmer-Gembeck & Skinner, 2010).

Nonetheless, according to recent meta-analytic reviews most of these findings have come from cross-sectional studies (Aldao et al., 2010; Compas et al., 2017; Schäfer et al., 2017) and the existing literature has several limitations. First, most of the research between coping and depressive symptoms included adults and had small sample sizes. Second,

there is limited research about the reversed effect of depressive symptoms on coping. This might be interesting as it is also possible that the level of symptoms is associated with an increased or decreased use of coping strategies, as this may interfere with the ability to use strategies when facing stress (Compas et al., 2017).

Furthermore, gender differences are often not included in analyses. The risk of depression differs when girls and boys reach adolescence (Avenevoli et al., 2015), and therefore the associations of coping strategies with depressive symptoms may also differ, depending on the moment in development at which coping strategies and depressive symptoms are measured (Carlson & Grant, 2008). Preliminary empirical evidence also suggests that boys and girls differ in coping strategies. According to some studies, girls are more likely to seek support and use more active approach coping strategies compared to boys (Eschenbeck, Kohlmann, & Lohaus, 2007; Frydenberg & Lewis, 1993). However, the findings are inconsistent and there are also studies that have shown opposite effects (Griffith, Dubow, & Ippolito, 2000; Hampel & Petermann, 2005). Allowing for gender differences is important as prevention and intervention programs can adapt to these differences and increase the effectivity.

To address these limitations, the present study provided a longitudinal and bidirectional perspective on the association between coping strategies and depressive symptoms using a sample of 1,341 adolescents who participated in a Randomized Controlled Trial (RCT) examining the effectiveness of a universal depression prevention program. In addition, we allowed for gender differences in the associations between coping strategies and depressive symptoms. We also controlled for condition (intervention versus control), educational level, and ethnicity as they may interfere with depressive symptoms (Costello & Maughan, 2015). Although coping strategies can be classified in domains, such as adaptive and maladaptive, or primary control (acting directly on the source of stress), secondary control (strategies to adapt to the source of stress), and disengagement coping (strategies to take distance to the source of stress; Compas et al., 2017), the present study will examine single coping strategies in relation to depressive symptoms. This might yield a more nuanced picture of this relationship, which can be translated into practical guidelines that can be incorporated into prevention programs. Therefore, the present study investigates the following strategies: problem focusing, cognitive restructuring, avoidance, distraction, and seeking support in relation to depressive symptoms over time. Even though the list of coping strategies is extensive, these are the most used strategies in literature and in coping questionnaires (Skinner, Edge, Altman, & Sherwood, 2003).

Present study

We analyzed the associations between five single coping strategies and depressive symptoms using bidirectional cross-lagged models. Based on the findings of Garnefski et al. (2002 and 2003) and Schäfer et al. (2017), we expected to find a negative association over time between problem focusing and positive cognitive reframing and depressive symptoms and we proposed positive associations over time between distraction and avoidance and depressive symptoms. While we expected to find negative associations over time between seeking support and depressive symptoms in this early adolescent phase, we were aware that this could change as adolescents reach the mid-adolescent phase (Compas et al., 2017; Rueger et al., 2016). In addition, we explored whether the reverse direction, depressive symptoms predicting an increased or greater use of specific coping strategies, was true. Given the limited literature on the association between depressive symptoms and coping, these analyses were explorative. Finally, due to inconsistencies regarding the role of gender in coping strategies, we performed additional analyses to explore the role of gender in the relationship between coping strategies and depressive symptoms.

Method

Participants and Procedure

The sample comprised 1,341 participants from 54 classes of 9 secondary schools in the southern and middle part of the Netherlands who participated in the Randomized Controlled Trial of the universal depression prevention program 'Op Volle Kracht' (OVK), which translates to 'On Full Power' (see Tak et al., 2016). This study was approved by the ethical committee of the research institute. There were no differences between the intervention and control group in levels of depressive symptoms and coping strategies on baseline and follow-ups. In addition, there was no effect of OVK on the levels of depressive symptoms or coping strategies at any time points. The participants' mean age was 13.91 (SD = 0.55), and 47.5 % were girls. Most participants were of Dutch origin (83.1%), and 7% were involved in prevocational education, 51.2% in higher general education, and 41.8% in pre university education.

Schools decided whether to participate in the study. All adolescents in the eighth grade of participating schools were eligible to participate (age range of 11–14). However, the pupils and their parents were informed about the study and were allowed to withdraw from the study at any point. Schools were randomly assigned to the intervention or control condition. Schools in the intervention condition integrated the OVK intervention in the school curriculum during mentor lessons. Schools in the control condition followed the schedule as usual.

Assessments were conducted by administering questionnaires at six time points, baseline (T1), and at 6-month (T2), 12-month (T3), 18-month (T4), 24-month (T5), and 30-month (T6) after baseline. Coping strategies were measured at five timepoints, and the questionnaire was not administered at T6 due to the length of the questionnaire and for practical reasons. Adolescents received incentives in the form of a gift voucher to complete each assessment. Retention rates were high across all assessments: 96.5% of the participants completed pre-intervention, 89.4% completed post-intervention, 89.3% completed the 6-month follow-up, 83.7% completed the 12-month follow-up, 77.4% completed the 18-month follow-up, and 84.5% completed the 24-month follow-up.

Measures

Coping strategies. We measured coping strategies with the Dutch version of the 54-itemed Children Coping Strategies Checklist-Revised (CCSC-R; de Boo & Wicherts, 2009). Adolescents had to rate whether they use a specific coping style when they face a problem on a 4-point scale ranging from 1 (almost never) to 4 (almost always). The questionnaire comprised five scales and 13 subscales. The five subscales were problem focusing that assessed

cognitive decision-making, direct problem solving, and seeking understanding (12 items; e.g., 'Do something to make things better'); positive cognitive reframing that assessed positive and optimistic thinking and control (12 items; e.g., 'Tell yourself that you can handle the problem'); distraction strategies that assessed the physical release of emotions and distracting actions (9 items; e.g., 'Listen to music'); avoidance strategies that assessed avoidant actions such as repressing and wishful thinking (12 items; e.g., 'Just forget about it'); and seeking support, which assessed seeking support to cope with actions and feelings (9 items; e.g., 'Tell others how you feel about the problem'). Cronbach's alpha ranged from 0.88 to 0.91 for problem focusing, from 0.87 to 0.91 for positive cognitive reframing, from 0.74 to 0.79 for distraction, from 0.73 to 0.85 for avoidance, and from 0.91 to 0.93 for seeking support across the different time points.

Depressive Symptoms. We measured depressive symptoms with the Children's Depression Inventory (CDI; Kovacs, 1985; Timbremont, Braet, & Roelofs, 2008). The CDI is a self-report questionnaire comprising 27 items, each consisting of three statements rated in severity from 0 to 2 (e.g., I don't feel alone = 0, I often feel alone = 1, I always feel alone = 2). The sum of the scores of depressive symptoms ranged from 0 to 54. Cronbach's alpha ranged from 0.84 to 0.91, indicating a high reliability of all assessments. Item 9 measured suicidal ideation; it was excluded from the questionnaire as this was beyond the scope of this research project.

Demographic variables. This study included the following demographic variables: age, gender, condition, educational level, and ethnicity. We included these variables as covariates as these factors are known to be associated with depressive symptoms and therefore might influence the results (Costello & Maughan, 2015). Ethnicity was measured by asking adolescents in which country they and their parents were born. When the adolescent or one of the parents was not born in the Netherlands, the adolescent was labeled as having a migration background. Although Tak et al. (2016) found no differences in results between adolescents in the experimental condition versus the control condition, we included this variable to control for possible effects.

Strategy of Analyses

Means, standard deviations, and correlations were computed for all outcome variables included in this study. The associations between coping strategies and depressive symptoms over time (five time points) were tested with five cross-lagged models for each of the five coping strategies. Because the number of parameters to be estimated in the model would increase rapidly by using items as indicators of the latent variables, with the consequence that power to detect important parameters will decrease (Yang & Dunson, 2010) and estimation problems will increase (Sass & Smith, 2006), we decided to use four

parcels as indicators of the latent variable depressive symptoms and three parcels for each of the coping strategies. The items of each construct at T1 were allocated to three or four equivalent parts (parcels) according to the item-to-construct balance method (Little, Cunningham, Shahar, & Widaman, 2002). Parcels for the latent variables at T2 – T5 had identical indicators as the parcels at T1.

Adolescents were nested within 54 classes and classes were nested within nine schools. Correcting for clustering effects with three-level multilevel analysis was not possible because the number of schools was too low. To correct for school effects, eight dummy variables representing nine schools (see Cohen, Cohen, West, & Aiken, 2003, p. 303—307) were regressed on intercept and slope as the first step in our analyses. To correct for clustering effects within classes, the TYPE=COMPLEX procedure in Mplus version 7.2 was used (Muthén & Muthén, 1998-2015). The Full Information robust Maximum Likelihood (FIML) estimator was used to account for missing values. This estimator requires that missing values are Missing At Random (MAR), but there are no statistical MAR-tests (Nakagawa, 2015). Therefore, we tested for the data mechanism Missing Completely At Random (MCAR) with all outcome variables. Little's MCAR test was significant, $\chi^2(791)=865.22$, $p = 0.034$, indicating that missing values were not MCAR (Little, 1995). This result does not provide a definite answer for MAR so we used the FIML-estimator under the assumption of MAR. Besides χ^2(df) and p, two model fit measures were used: (a) the Root Mean Square Error of Approximation (RMSEA; Byrne, 2005; Kaplan, 2000) and (b) the Bentler Comparative Fit Index (CFI; Kaplan, 2000; Kline, 1998). RMSEA values lower than or equal to 0.05 are preferred, but values under 0.08 are acceptable while CFI values above 0.95 (0.90) are indicative of a fair (acceptable) fit. Occasionally, unacceptable or untrusted parameter estimates are found during SEM-analyses. In that case, causes and consequences are examined and solutions are found. No unacceptable or untrusted parameter estimates were found in this study.

Cross-lagged analyses were performed for each coping strategy in combination with depressive symptoms. An overall model including depressive symptoms and the five coping strategies would have created a very complex model with too many parameters to be estimated (1,054) in relation to the sample size (1,341). For this reason, we decided to analyze five cross-lagged models separately. All latent variables of the cross-lagged model were regressed on the eight dummy variables for school effects and on the control variables age, condition, education level, and ethnicity. The parameters of the cross-lagged model were estimated freely (in the baseline model). To test equality of regression weights of cross paths, we first tested a model by constraining the cross paths between every consecutive time points to be equal. If this constrained model showed a significant difference with the baseline model (a significant increase of chi-square), post hoc χ^2-difference tests were used to test which pair(s) of cross paths were significantly different. Because a robust

ML-estimator was used (due to the COMPLEX procedure), the χ^2-values were robust and had to be rescaled to unbiased χ^2-values before using the χ^2-difference tests (Satorra & Bentler, 2010). This test statistic is known as the Sattora-Bentler (SB) scaled χ^2-difference test. The robust ML-estimator is also robust against non-normality of the variables (see depressive symptoms in Table A in the Appendix), parameters in the cross-lagged models are estimated with robust standard errors.

To explore gender differences in regression weights of cross-lagged relations, we used multiple group analysis. First, a baseline model was estimated without constraints between boys and girls. The fit of this model was the baseline χ^2. In the second model, the regression weights of cross paths were constrained to be equal across gender, and the χ^2 of this model was compared with the baseline. A significant difference in χ^2 is an indication that one or more paths are different for boys and girls.

Results

Descriptive statistics (Mean, SD, and correlations for each time point) of depressive symptoms and coping strategies are presented in Table A and Table B in the appendices. The mean for depressive symptoms was 7.55, which is far below the cut-off of 13 that is used to screen for depressive symptoms (Timbremont, Braet, & Dreessen, 2004), indicating that this is a relative healthy sample that is comparable with other universal prevention studies in non-high-risk population samples (e.g., Challen, Machin, & Gillham, 2014; Horowitz & Garber, 2006). Girls reported a greater use of seeking support on all timepoints compared to boys. In addition they reported more problem focusing at T3, T4, and T5, positive cognitive reframing at T5, and avoidance at T1 and T5. Regarding depressive symptoms, girls reported higher levels of depressive symptoms at T1 but lower levels of symptoms at T4 compared to boys. No baseline differences in study variables were found for age, condition, educational level, or ethnicity.

Prior to the final cross-lagged analyses, we tested measurement equivalence for each of the six latent variables over time and across gender. To compare unstandardized regression coefficients of the cross-lagged models, configural equivalence and weak metric equivalence is required (Guenole & Brown, 2014; Keith, 2014). Configural equivalence means that the number of factors and pattern of loadings (but not the strengths of the loadings), are the same over time or across gender. Weak metric equivalence is an additional requirement, and means equal metrics (= equal scale intervals) of a latent variable over time or across gender. Factor loadings define the metric of measurement and represent the strength of the relationship between a factor (latent variable) and indicators (parcels in our case). When factor loadings of a latent variable are equal over time, or across gender, the unit of measurement is also equal and relationships with other (latent) variables can be studied (Wang, Chen, Dai, & Richardson, 2018). This allows the comparisons of unstandardized regression coefficients and covariances over time and across groups (Steenkamp & Baumgartner, 1998).

If the fit measures of the configural model are acceptable, configural equivalence is supported. For weak metric equivalence, the factor loadings of the identical parcels over time are constrained to be equal. The fit of this constrained model is compared with the baseline or configural model. Strong metric equivalence was tested by additionally constraining the corresponding intercepts to be equal over time. The fit of this model was compared with the factor loadings constrained model. A decrease of CFI < .01 and an increase of RMSEA < .015 supported the weak or strong metric equivalence of the longitudinal factor model (Chen, Curran, Bollen, Kirby, & Paxton, 2008; Cheung & Rensvold, 2002). The results are presented in Table C in the appendices. For weak metric

equivalence, the decrease of CFI for all models was < 0.01 and the increase of RMSEA was just a little above the threshold of 0.015, only for gender in relation to seeking support. Weak measurement invariance is supported for all six latent variables and (with one small exception) for gender. For strong measurement equivalence (allowing comparisons of latent means over time and across groups), a decrease of CFI by more than 0.01 was found for gender in relation to distraction, avoidance and seeking support. An increase of RMSEA by more than 0.015 was found for positive cognitive reframing and gender of positive cognitive reframing, for gender of distraction, for avoidance and gender of avoidance and for seeking support. This means that strong metric equivalence was not always met for some latent variables in combination with gender. As already noted, for testing paths of the cross-lagged models, weak measurement invariance is sufficient. In the last four columns of Table C, the range of the factor loadings across five time points are presented, including their means and standard deviations. As can be seen in Table C, all factor loadings are high indicating that the parcels represent their factor very well for each time point.

Cross-lagged models of coping strategies with depressive symptoms

1) Problem focusing

The fit of the cross-lagged model was good; χ^2 (769) = 1426.38, p < 0.001, CFI = 0.978, RMSEA = 0.025, 90% CI: 0.023 - 0.027, p(RMSEA) = 1.000. The model chi-square test was significant, indicating a poor model fit. However, in large samples chi-square is almost always significant and global fit measures can be used as an alternative. CFI was > 0.95 and RMSEA was < 0.05 and, according to the norms used for global fit measures, these values indicate a good model fit. Problem focusing did not predict depressive symptoms over time. Depressive symptoms had a significantly negative association with problem focusing over time, from T1 to T2, T2 to T3, and T3 to T4, indicating that elevated depressive symptoms were associated with lower levels of problem focusing six months later. Figure 1 presents the completely standardized parameter estimates[1,2]. Using the SB-scaled χ^2-difference test, we first tested whether the four pairs of cross paths were significantly different by constraining the cross paths between T1 and T2 to be equal, as well as between T2 and T3, between T3 and T4, and between T4 and T5. This test was significant (χ^2 (4) = 26.08, p = < 0.001). Post-hoc difference tests showed that the cross paths were different between T1 and T2 (χ^2 (1) = 8.03, p = 0.005), between T2 and T3 (χ^2 (1) = 27.05, p = < 0.001), and between T3 and T4 (χ^2 (1) = 3.99, p = 0.046). This means that the negative associations between depressive symptoms and problem focusing

1 Table D in the Appendix presents the unstandardized associations between study variables and covariates.

2 Table E in the Appendix presents the unstandardized results of the cross-lagged analyses.

were significantly greater compared to the associations between problem focusing and depressive symptoms at the same time points. The SB-scaled χ^2-difference test showed no significant difference in cross paths between boys and girls (χ^2 (8) = 24.26, p = 0.075).

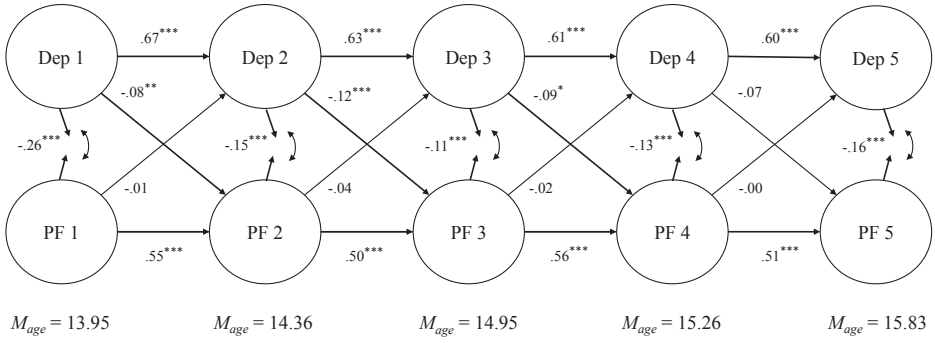

Figure 1. Cross-lagged model of depressive symptoms and problem focusing.

2) Positive cognitive reframing

The fit of the cross-lagged model was χ^2 (769) = 1521.13, p < 0.001, CFI = 0.975, RMSEA = 0.027, 90% CI: 0.025 - 0.029, p(RMSEA) = 1.000. The global fit measures CFI and RMSEA indicated a good fit. Positive cognitive reframing did not predict depressive symptoms over time. Depressive symptoms were significantly negatively associated with positive cognitive reframing over time, from T1 to T2 and from T2 to T3, indicating that higher depressive symptoms were associated with lower levels of positive cognitive reframing six months later (see Figure 2). With the SB-scaled χ^2-difference test, we found that one or more of the four pairs of cross paths were significantly different (χ^2 (4) = 11.01, p = 0.026). Post-hoc difference tests showed that the cross paths were different between T1 and T2 (χ^2 (1) = 3.95, p = 0.047) and between T2 and T3 (χ^2 (1) = 4.41, p = 0.036). This indicates that the negative associations between depressive symptoms and positive cognitive reframing were significantly greater compared to the associations between positive cognitive reframing and depressive symptoms at the same time points. The SB-scaled χ^2-difference test showed no significant difference in cross paths between boys and girls (χ^2 (8) = 7.31, p = 0.504).

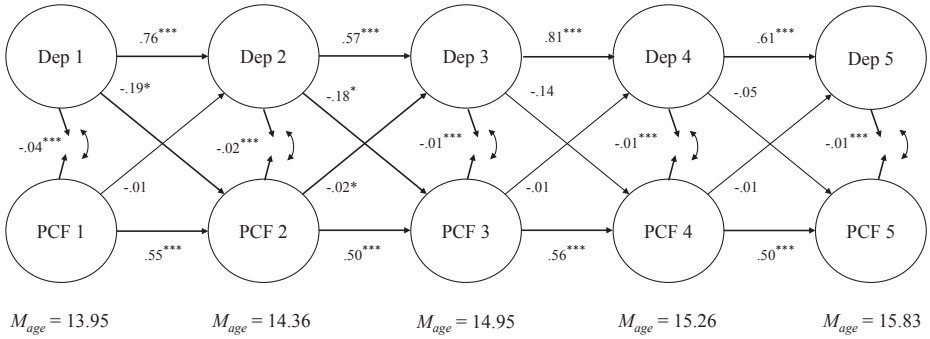

*Figure 2***.** Cross-lagged model of depressive symptoms and positive cognitive reframing.

3) Distraction

The fit of the cross-lagged model was χ^2 (769) = 1588.13, p = < 0.001, CFI = 0.965, RMSEA = 0.028, 90% CI: 0.026 - 0.030, p(RMSEA) = 1.000. The global fit measures indicated a good model fit. Distraction did not predict depressive symptoms over time. Depressive symptoms had a significant negative association with distraction over time, from T3 to T4 (see Figure 3). Using the SB-scaled χ^2-difference test, we found that cross paths were not significantly different (χ^2 (4) = 5.26, p = 0.262). The SB-scaled χ^2-difference test showed a significant difference in cross paths between boys and girls (χ^2 (8) = 16.61, p = 0.034). Post-hoc testing showed that cross path Dep T2 to DS T3 was significantly different for boys and girls (χ^2 (1) = 3.91, p = 0.048), with B = -0.01 and p = 0.955 for boys and B = 0.19 and p = 0.004 for girls. Girls' elevated depressive symptoms at T2 predicted an increase in distraction strategies at T3, but this association was not found for boys.

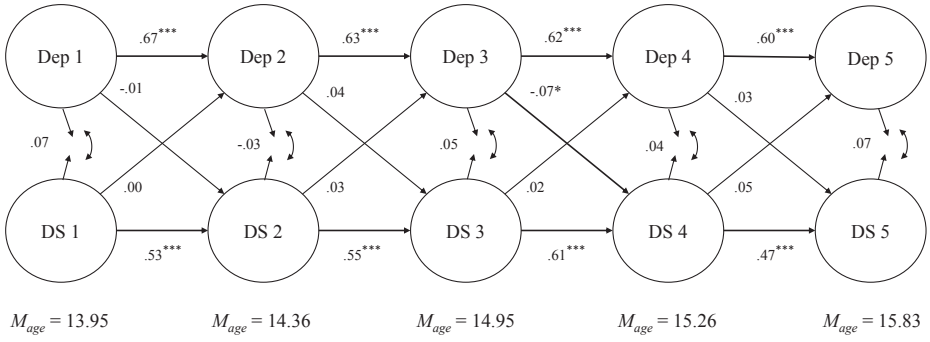

Figure 3. Cross-lagged model of depressive symptoms and distraction.

4) Avoidance

The fit of the cross-lagged model was χ^2 (769) = 1491.348, p < 0.001, CFI = 0.971, RMSEA = 0.026, 90% CI: 0.024 - 0.028, p(RMSEA) = 1.000. The fit measures CFI and RMSEA indicated a good model fit. No significant cross-associations were found between avoidance and depressive symptoms (see Figure 4). The SB-scaled χ^2-difference test showed a significant difference in cross paths between boys and girls (χ^2 (8) = 25.55, p = 0.001). Post-hoc testing revealed that cross path Dep T2 to AV T3 was significantly different for boys and girls (χ^2 (1) = 10.31, p = 0.001), with B = -0.02 and p = 0.838 for boys, and B = 0.28 with p = 0.011 for girls; cross path Dep T3 to AV T4 was significantly different for boys and girls (χ^2 (1) = 7.92, p = 0.005), with B = -0.29 and p = 0.005 for boys and B = 0.09 with p = 0.394 for girls; and cross path Dep T4 to AV T5 was significantly different for boys and girls (χ^2 (1) = 6.17, p = 0.013), with B = 0.02 and p = 0.824 for boys and B = 0.24 with p = 0.001 for girls. The results suggest that elevated depressive symptoms in boys at T3 were associated with lower levels of avoidance strategies six months later. Regarding girls, elevated depressive symptoms at T2 and T4 were associated with an increase in avoidance strategies six months later.

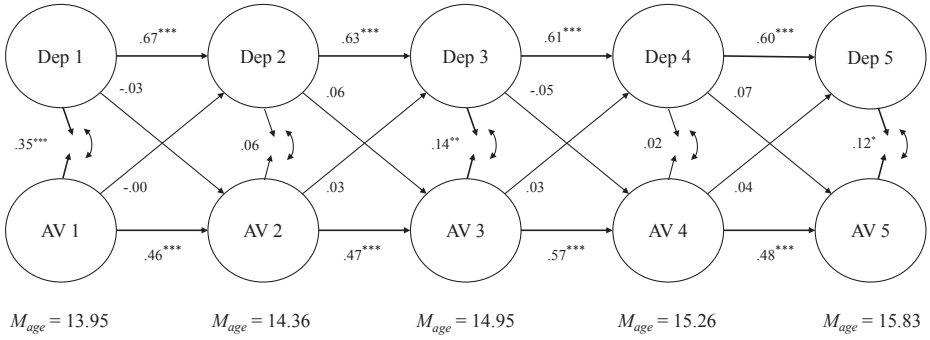

Figure 4. Cross-lagged model of depressive symptoms and avoidance.

5) Seeking support

The fit of the cross-lagged model was χ^2 (769) = 1566.92, p = < 0.001, CFI = 0.975, RMSEA = 0.028, 90% CI: 0.026 - 0.030, p(RMSEA) = 1.000. The fit measures CFI and RMSEA indicated a good model fit. Seeking support at T2 showed significantly negative association with depressive symptoms at T3 and vice versa. Depressive symptoms showed a significantly negative associations with seeking support over time, from T1 to T2 and from T2 to T3, indicating that elevated depressive symptoms at T1 and T2 were associated with lower levels of seeking support six months later (see Figure 5). With the SB-scaled χ^2-difference test, we found that cross paths were significantly different (χ^2 (4) = 15.17, p = 0.004). Post-hoc difference tests showed that the cross paths between T2 and T3 (χ^2 (1) = 9.44, p = 0.002) were

significantly different. This indicates that the negative associations between depressive symptoms and seeking support were significantly greater at six months compared to the associations between seeking support and depressive symptoms on the same time points. The SB-scaled χ^2-difference test showed no significant difference in cross paths between boys and girls (χ^2 (8) = 10.91, p = 0.207).

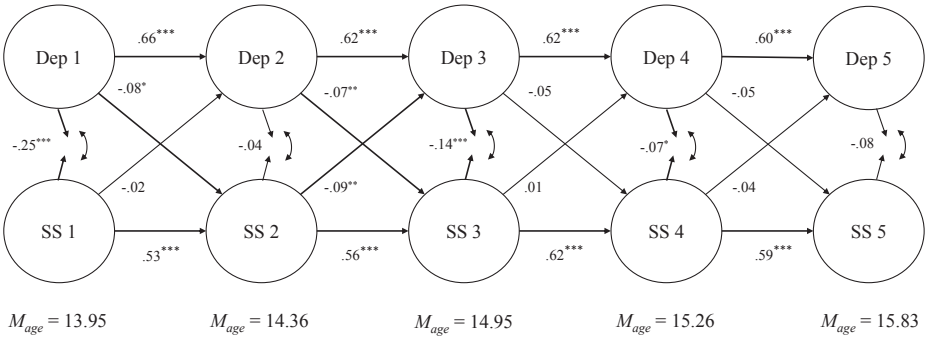

Figure 5. Cross-lagged model of depressive symptoms and seeking support.

Discussion

The aim of the present study was to investigate the bidirectional associations between coping strategies and depressive symptoms over time. It was expected that adolescents high in problem focusing, positive cognitive reframing, and seeking support would experience fewer depressive symptoms. Likewise, we expected that adolescents high in distraction and avoidance would experience more depressive symptoms. The analyses regarding the reversed effect of depressive symptoms on coping strategies were exploratory. Additionally, we explored the role of gender differences in these relations.

In contrast to the hypotheses, no robust significant associations between coping strategies and depressive symptoms emerged. Of the 40 associations tested, we found that coping affected depressive symptoms over time only in one association. However, there was an indication for the reverse relationship. When adolescents experienced elevated depressive symptoms, they used fewer adaptive techniques to target stress in practical ways, using, for example, problem-solving and cognitive decision-making. Additionally, depressive symptoms had a negative association with positive cognitive reframing and seeking support but only at the first two time points. One cross path showed a significant negative association between depressive symptoms and distraction. Although this effect was not consistent over time, it was contrary to expectations and in contrast with research that classified distraction as maladaptive (Aldao et al., 2010).

Significant gender differences were found in depressive symptoms and avoidance across three time points. For boys, a higher score of depressive symptoms was related with lower levels of avoidance strategies. For girls, a higher score on depressive symptoms was related to an increase in avoidance and distraction strategies. However, significant findings among gender differences were neither consistent nor robust. Future studies should clarify these findings to draw further conclusions.

The prospective one-way association between depressive symptoms and the use of problem focusing and positive cognitive reframing was inconsistent with our hypotheses, previous studies (e.g., Aldao & Nolen-Hoeksema, 2010; Garnefski et al., 2003), and models in which bidirectional associations between cognitive variables and depressive symptoms are integrated, such as the transactional framework (Hankin & Abramson, 2001). In these models, maladaptive cognitive schemas predicted depressive symptoms and vice versa. Inconsistencies with previous studies could be caused by differences in the developmental period that were captured or the timing and spacing of measurement intervals (Collins & Graham, 2002); however, there could be other reasons for this inconsistency.

One explanation could be that adolescents with elevated depressive symptoms are less able to use active problem solving and they tend to revert to other strategies, which suggests the presence of a third factor. This argument is also supported by the meta-analysis by Compas et al. (2017). The researchers stated that due to the lack of longitudinal designs, little is known about the actual direction of coping with psychopathology symptoms. While researchers in general might be more interested in the effect of coping strategies on symptoms for practical reasons, Compas et al. (2017) argued that high levels of symptoms may impede the development of these skills or the ability to use them effectively. It would be interesting to investigate the initial level of symptoms or specific characteristics of depressive symptoms in relation to coping strategies.

Following this argument, another explanation might concern methodological issues. Most studies included cross-sectional designs; hence, the stability over time might have been missed. Multiple subsequent time points should be included in studies to generate substantial conclusions regarding the associations between coping strategies and depressive symptoms (Sameroff & Mackenzie, 2003). The current finding regarding significant associations between depressive symptoms and problem focusing was consistent across four measurements, which increases the reliability of our conclusion. Moreover, the associations between depressive symptoms and coping strategies were analyzed by including the within time correlations and stability in depressive symptoms and coping strategies subscales over time. Inclusion of these factors is important as this provides a more accurate image of the complex associations between depressive symptoms and coping strategies. Nevertheless, current findings need to be replicated before firm conclusions can be made.

Although the findings in the coping literature provide evidence for gender-specific coping preferences, little is known about the direction and effect of coping strategies on psychopathology symptoms. Adult studies have shown that females often report using seeking support, rumination, positive self-talk, and problem solving while males tend to use avoidant strategies or passivity (Eschenbeck et al., 2007; Tamres, Janicki, & Helgeson, 2002). The differences between men and women regarding the efficacy of specific strategies have not been clarified yet. This study showed that for boys, elevated depressive symptoms were associated with lower levels of avoidance strategies, whereas in girls, elevated depressive symptoms were associated with higher levels of avoidance strategies. This is not in accordance with the findings in a recent meta-analysis by Schäfer et al. (2017), in which it was stated that maladaptive strategies, such as avoidance, were more strongly associated with depressive symptoms among men compared to women. Despite the fact that literature on this subject in adolescence is scarce, adult literature suggests that there are both differences and similarities in the relationship between coping and depressive symptoms in men and women. Holahan, Moos, Holahan, Brennan, and Schutte (2005)

found that for women, avoidant coping was linked to depressive symptoms both directly as well as indirectly through life stressors. For men, life stressors completely explained the relationship between avoidant coping and depressive symptoms. Future research should examine the effect of gender on the relation between depressive symptoms and avoidance more closely to replicate our findings and to examine the consequences of this difference.

Strengths and Limitations

This study has some strengths and limitations that provide direction for future research. We used longitudinal data from a large general community sample of adolescents, which facilitates the generalization of the results. Additionally, a sample drawn from the general population reduces biases known in clinical research, such as comorbidity, severity of symptoms, and treatment seeking (Goodman et al., 1997). However, most adolescents experienced no depressive symptoms and a small group experienced low to mild depressive symptoms which might have limited the results because of the lack of variance and attenuation of the associations that were examined. Additionally, since the study included relatively healthy adolescents, the associations between coping strategies and depressive symptoms might be different for adolescents who experience depression or a higher level of depressive symptoms. Furthermore, the study was based on self-reported data and could therefore be vulnerable to biases. Also, we did not include an assessment regarding sources of the stress that the adolescents experienced, which is an important limitation because some strategies might be adaptive in one situation but not adaptive in another (e.g., problem focusing is less adaptive when one needs to cope with the loss of a loved one). Therefore, we recommend that future studies should include more information about the chronicity or controllability of the stressors.

Regarding the statistical/methodological strengths and limitations, we made use of item parceling which has several advantages and disadvantages (see Little et al., 2002). Regarding this discussion, researchers concluded that parceling is effective when items within a parcel measure the same construct and this was the case in the current study (Bandalos & Finney, 2001). A statistical limitation is that the large autocorrelations of the latent variables over time could decrease the chances for finding cross-lagged effects. Controlling for past levels of predictors will dramatically reduce the magnitude of cross-lagged effects, especially if autoregressive paths (stability paths) are strong (Adachi & Willoughby, 2015). However, small effect sizes for cross-lagged effects (standardized regression weights) in longitudinal models are the rule rather than the exception. Current guidelines to judge effect sizes are mostly based on cross-sectional research (were stability over time is not controlled). The small effect sizes in longitudinal studies must be assessed according to standards based on longitudinal research. In models with high stability paths, as in this study, small cross-lagged significant effects are not trivial (Adachi & Willoughby, 2015).

Implications for practice and future research

This study has implications for practice and provides interesting new directions for future research. First, the finding that depressive symptoms only seem to interfere with the ability to use problem-focused coping strategies rather than the other way around when facing stress implies that altering coping strategies through depression prevention would not necessarily decrease depressive symptoms. This is in line with a review of Stice et al. (2009) who stated that the content of depression prevention programs was weakly or not associated with a decrease in depressive symptoms. Although more research is necessary to draw conclusions about the effectiveness or ineffectiveness of targeting coping strategies in prevention or intervention, practitioners and researchers should investigate other concepts in the prevention of depression, such as examining techniques that are more behavioral rather than cognitive.

Behavioral activation technique, for instance, focuses on mood monitoring and daily activities to increase positive activities and positive interactions with the environment. Behavioral activation has already proven to be effective in depression treatments and would be a cost-effective solution for prevention programs targeting adolescents with elevated depressive symptoms (Cuijpers, van Straten, & Warmerdam, 2007; Ekers et al., 2014). To investigate the effect of activation on adolescents' mood, the Experience Sample Method (ESM) is an appropriate methodology. ESM is a daily diary method that requires the participants are to report their thoughts and feelings in the moment at multiple time intervals, using, for instance, smart phone mobile apps. In addition to investigating fluctuations over short time rather than long term developments (de Haan-Rietdijk, Voelkle, Keijsers, & Hamaker, 2017), technological developments have made it possible to give participants personalized feedback and thus give insight into their mood and activities (Myin-Germeys, Klippel, Steinhart, & Reininghaus, 2016). Research has shown that this is a promising and feasible solution to increase positive affect in people with depressive symptoms (Van Roekel et al., 2017).

Second, future research should include longitudinal and dynamic methodology to investigate the concept of coping in relation to depressive symptoms to draw more substantial conclusions. Facing these demands, a promising solution would be to utilize person-centered and data-driven methods to identify profiles of adolescents who use similar patterns of coping strategies (Aldao, 2013). The few studies that have used a person-centered approach have shown that this approach can be successful in extracting coping profiles (Dixon-Gordon, Aldao, & De Los Reyes, 2015; Lougheed & Hollenstein, 2012; van den Heuvel, Stikkelbroek, Bodden, & van Baar, 2020). Moreover, this provides the opportunity to investigate divergence in developmental trajectories of coping strategies as well the development of depressive symptoms. Regarding coping, it would

be interesting to investigate whether strategies are stable across adolescence or transform with development. Prevention programs could benefit from information on the course of depressive symptoms by adapting programs to the needs of subgroups or to establish the ideal starting point for prevention. Innovative approaches in future research are required to improve our prevention programs focused on reducing depression among adolescents.

Appendix

Table A

Descriptive Statistics of Study Variables

Measures	Mean (SD)	Total Kurtosis
Depressive symptoms T1	7.55 (5.70)	3.41
Depressive symptoms T2	8.06 (6.59)	5.36
Depressive symptoms T3	7.70 (6.32)	8.95
Depressive symptoms T4	8.56 (8.18)	7.08
Depressive symptoms T5	8.63 (8.15)	6.81
Depressive symptoms T6	8.18 (7.44)	7.20
Problem Focusing T1	2.47 (.59)	-.11
Problem Focusing T2	2.46 (.60)	.02
Problem Focusing T3	2.48 (.57)	.10
Problem Focusing T4	2.39 (.60)	.23
Problem Focusing T5	2.43 (.57)	.20
Positive Cognitive Reframing T1	2.28 (.57)	-.13
Positive Cognitive Reframing T2	2.31 (.61)	-.09
Positive Cognitive Reframing T3	2.30 (.58)	.00
Positive Cognitive Reframing T4	2.28 (.60)	.35
Positive Cognitive Reframing T5	2.28 (.58)	.26
Avoidance T1	1.97 (.53)	.02
Avoidance T2	2.09 (.55)	.52
Avoidance T3	2.04 (.51)	.58
Avoidance T4	2.09 (.56)	.92
Avoidance T5	2.02 (.51)	.15
Distraction T1	2.12 (.47)	.37
Distraction T2	2.16 (.51)	.20
Distraction T3	2.12 (.49)	.40
Distraction T4	2.15 (.54)	.83
Distraction T5	2.12 (.52)	.27
Seeking Support T1	2.06 (.71)	-.57
Seeking Support T2	2.22 (.74)	-.61
Seeking Support T3	2.22 (.73)	-.56
Seeking Support T4	2.24 (.73)	-.39
Seeking Support T5	2.25 (.71)	-.44

$^{*}p < .05$, $^{**}p < .001$.

	Girls	Boys	
Skewness	Mean (SD)	Mean (SD)	t-value
1.43	8.32 (6.10)	6.86 (5.22)	4.70**
1.76	8.27 (6.25)	7.87 (6.88)	1.08
2.20	7.73 (5.50)	7.69 (7.00)	.11
2.24	8.00 (6.58)	9.08 (9.39)	-2.27*
2.18	8.44 (7.17)	8.82 (9.02)	-.76
2.12	8.15 (6.45)	8.21 (8.26)	.14
.16	2.50 (.56)	2.44 (.61)	1.57
-.00	2.48 (.55)	2.42 (.64)	1.72
.08	2.55 (.54)	2.42 (.59)	3.77**
.12	2.47 (.53)	2.34 (.65)	3.90**
.00	2.50 (.54)	2.38 (.59)	3.32**
.16	2.25 (.54)	2.31 (.60)	-1.84
.10	2.30 (.57)	2.34 (.65)	-1.17
.01	2.32 (.57)	2.29 (.59)	1.03
.24	2.32 (.56)	2.25 (.63)	2.07*
.11	2.31 (.54)	2.26 (.60)	1.32
.26	2.15 (.48)	2.10 (.46)	2.14*
.34	2.17 (.47)	2.16 (.55)	.08
.43	2.14 (.48)	2.09 (.51)	1.74
.51	2.18 (.49)	2.13 (.57)	1.75
.25	2.16 (.48)	2.09 (.55)	2.27*
.57	1.96 (.51)	1.97 (.54)	-.34
.37	2.07 (.51)	2.11 (.58)	-1.05
.40	2.03 (.50)	2.04 (.53)	-.07
.54	2.09 (.52)	2.09 (.59)	-.01
.41	2.02 (.47)	2.01 (.55)	.29
.37	2.20 (.72)	1.93 (.67)	7.23**
.15	2.39 (.72)	2.07 (.72)	7.83**
.23	2.44 (.53)	2.04 (.68)	9.84**
.20	2.42 (.72)	2.08 (.70)	8.08**
.16	2.40 (.71)	2.13 (.69)	6.16**

Table B

Correlations Among Study Variables for Girls and Boys

Measures	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Dep T1	-	.70***	.64***	.50***	.44***	.50***	-.16***	-.18***	-.09*	-.11**	-.13**	-.31***	-.26***	-.11**	-.11*
2. Dep T2	.49***	-	.69***	.55***	.51***	.47***	-.14***	-.20***	-.14***	-.12**	-.13**	-.26***	-.32***	-.18***	-.16***
3. Dep T3	.45***	.47***	-	.65***	.52***	.54***	-.13**	-.10*	-.15***	-.20***	-.14**	-.25***	-.24***	-.23***	-.20***
4. Dep T4	.28***	.28***	.53***	-	.69***	.60***	-.07	-.08	-.09*	-.17***	-.13**	-.23***	-.23***	-.17***	-.22***
5. Dep T5	.34***	.33***	.43***	.51***	-	.71***	-.07	-.14**	-.15***	-.22***	-.22**	-.11*	-.24***	-.11*	-.21***
6. Dep T6	.32***	.33***	.48***	.44***	.55***	-	-.07	-.11*	-.14***	-.14**	-.18**	-.15***	-.22***	-.16***	-.17***
7. PF T1	-.29***	-.13***	-.20***	-.12**	-.16***	-.14***	-	.49***	.39***	.38***	.38***	.50***	.32***	.19***	.18***
8. PF T2	-.16***	-.21***	-.14***	-.13***	-.11*	-.07	.50***	-	.46***	.41***	.34***	.34***	.63***	.26***	.22***
9. PF T3	-.17***	-.22***	-.22***	-.16***	-.16***	-.14***	.45***	.50***	-	.52***	.46***	.28***	.33***	.59***	.31***
10. PF T4	-.12**	-.14***	-.17***	-.23***	-.13**	-.16***	.34***	.48***	.52***	-	.54***	.26***	.33***	.39***	.64***
11. PF T5	-.20***	-.17***	-.22***	-.24***	-.24***	-.20***	.37***	.36***	.47***	.45***	-	.22***	.21***	.26***	.33***
12. PCF T1	-.32***	-.16***	-.22***	-.13***	-.16***	-.16***	.68***	.37***	.35***	.26***	.24***	-	.47***	.40***	.40***
13. PCF T2	-.18***	-.20***	-.15***	-.12**	-.08	-.13**	.43***	.76***	.38***	.42***	.29***	.50***	-	.49***	.45***
14. PCF T3	-.17***	-.19***	-.24***	-.16***	-.14***	-.14***	.35***	.36***	.70***	.43***	.36***	.48***	.47***	-	.59***
15. PCF T4	-.11**	-.12**	-.18***	-.20***	-.11*	-.14***	.27***	.39***	.42***	.78***	.35***	.36***	.48***	.56***	-
16. PCF T5	-.15***	-.12**	-.17***	-.16***	-.18***	-.15***	.20***	.15***	.31***	.28***	.70***	.26***	.29***	.45***	.44***
17. AV T1	.17***	.10*	.06	.08*	.04	.07	.22***	.09*	.04	.06	.00	.33***	.19***	.16***	.12**
18. AV T2	.03	.02	.00	.03	.07	.03	.16***	.45***	.12**	.22***	.08	.25***	.60***	.22***	.32***
19. AV T3	.03	-.04	.04	.02	.04	.04	.00	.02	.34***	.19***	.05	.13***	.15***	.51***	.28***
20. AV T4	-.01	-.05	-.07	-.02	-.02	-.08	.05	.17***	.16***	.53***	.10*	.15***	.27***	.31***	.70***
21. AV T5	.05	.02	.04	-.01	.07	.09	-.05	-.02	.08	.10*	.39***	.01	.09	.20***	.22***
22. DS T1	-.04	.01	-.06	-.03	-.03	-.05	.33***	.18***	.20***	.11**	.11*	.37***	.21***	.22***	.11**
23. DS T2	-.06	-.02	-.04	-.04	.03	-.03	.29***	.50***	.23***	.25***	.11*	.31***	.57***	.28***	.30***
24. DS T3	-.04	-.04	-.02	-.00	.04	.02	.15***	.21***	.46***	.24***	.10*	.20***	.26***	.51***	.29***
25. DS T4	-.03	-.05	-.09*	-.01	.03	-.04	.17***	.29***	.26***	.57***	.14***	.19***	.32***	.34***	.63***
26. DS T5	-.01	-.01	-.02	-.03	.07	.10*	.07	.10*	.12***	.12**	.38***	.07	.15***	.18***	.18***
27. SS T1	-.18***	-.09*	-.14***	-.07	-.10*	-.09*	.51***	.29***	.25***	.16***	.23***	.36***	.20***	.19***	.12**
28. SS T2	-.12**	-.08*	-.11**	-.08	-.05	-.05	.35***	.61***	.32***	.31***	.20***	.26***	.57***	.24***	.28***
29. SS T3	-.13***	-.13**	-.18***	-.09*	-.06	-.08*	.29***	.30***	.59***	.31***	.28***	.25***	.24***	.53***	.27***
30. SS T4	-.13***	-.12**	-.15***	-.13***	-.05	-.14***	.22***	.38***	.35***	.67***	.29***	.16***	.34***	.34***	.66***
31. SS T5	-.18***	-.13**	-.17***	-.15***	-.10*	-.09*	.21***	.25***	.28***	.31***	.59***	.12***	.22***	.26***	.25***

Note. Correlations for girls are presented above the diagonal; Correlations for boys are presented below the diagonal. $^{*}p < .05$, $^{**}p < .01$, $^{**}p < .001$. Dep = depressive symptoms, PF = problem focusing, PCF = positive cognitive reframing, AV = avoidance, DS = distraction, SS = seeking support.

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
-.09*	.38***	.19***	.22***	.17***	.19***	.07	.05	.07	.04	.04	-.22***	-.20***	-.15***	-.11**	-.14**
-.13**	.28***	.24***	.25***	.20***	.18***	.00	-.01	.07	.06	.03	-.18***	-.19***	-.15***	-.08	-.14***
-.15***	.28***	.24***	.30***	.24***	.20***	.03	.05	.07	.02	.04	-.15***	-.17***	-.22***	-.16***	-.21***
-.11*	.24***	.20***	.26***	.20***	.19***	.01	.02	.02	.04	.06	-.09*	-.12**	-.15***	-.15***	-.17***
-.20***	.30***	.22***	.23***	.17***	.24***	.08	.01	.05	.03	.08	-.14***	-.19***	-.20***	-.23***	-.22***
-.15***	.27***	.14***	.23***	.23***	.25***	.04	.02	.04	.06	.05	-.11**	-.16***	-.15***	-.12**	-.18***
.20***	.14***	-.01	-.02	-.01	-.03	.14***	.16***	.09*	.08	.05	.42***	.24***	.19***	.18***	.19***
.18***	.06	-.21***	.04	.07	.01	.14***	.33***	.09*	.12**	.09*	.33***	.57***	.27***	.22***	.21***
.30***	.03	.05	.20***	.08	.01	.15***	.14***	.26***	.14***	.12**	.23***	.28***	.52***	.31***	.26***
.38***	.01	.04	.07	.27***	.09*	.07	.22***	.24***	.42***	.22***	.19***	.24***	.26***	.51***	.26***
.62***	-.01	-.04	.05	.08	.21***	.08	.08	.13**	.17***	.27***	.23***	.24***	.34***	.36***	.53***
.31***	.17***	.06	.07	.07	.04	.27***	.20***	.12**	.15***	.07	.26***	.12**	.11*	.09*	.09*
.31***	.04	.32***	.13**	.13**	.03	.20***	.39***	.12**	.16***	.07	.21***	.43***	.20***	.17***	.11*
.48***	.08*	.13**	.36***	.20***	.17***	.17***	.23***	.36***	.27***	.18***	.06	.12**	.33***	.18***	.14**
.57***	.09*	.11*	.21***	.44***	.21***	.12***	.21***	.25***	.46***	.19***	.08	.16***	.19***	.42***	.19***
-	.05	.09*	.20***	.26***	.40***	.11***	.13***	.21***	.31***	.36***	.11*	.13**	.21***	.24***	.37***
.07	-	.37***	.39***	.36***	.37***	.25***	.16***	.10*	.13**	.07	-.06	-10*	-.13**	-.07	-.11*
.18***	.40***	-	.49***	.43***	.37***	.13**	.32***	.18***	.19***	.13**	-.01	.13**	-.04	-.02	-.01
.25***	.33***	.36***	-	.58***	.54***	.09*	.16***	.29***	.18***	.17**	-.10*	-.03	.02	.01	-.02
.25***	.24***	.39***	.44***	-	.59***	.06	.19***	.21***	.44***	.19***	-.03	.01	-.04	.15***	-.05
.62***	.25***	.30***	.37***	.34***	-	.09*	.07	.16***	.23***	.34***	-.13**	-.09	-.11*	-.05	-.00
.10*	.26***	.17***	.12**	.12***	.12**	-	.50***	.41***	.33***	.29***	.04	-.02	.03	.03	.01
.13**	.18***	.58***	.15***	.25***	.15***	.46***	-	.51***	.46***	.35***	.09*	.16***	.05	.14***	.06
.18***	.11**	.24***	.47***	.26***	.20***	.45***	.48***	-	.61***	.53***	.04	.04	.16***	.17***	.11*
.17***	.11**	.28***	.23***	.68***	.18***	.28***	.40***	.49***	-	.57***	.08	.06	.10*	.25***	.07
.45***	.06	.14***	.12**	.16***	.59***	.31***	.34***	.40***	.37***	-	.07	.04	.06	.14**	.15***
.11***	.10**	.07	-.03	.02	-.03	.27***	.18***	.10*	.07	.09*	-	.53***	.47***	.40***	.36***
.08	.07	.41***	.04	.16***	-.02	.21***	.53***	.20***	.25***	.16***	.47***	-	.57***	.48***	.44***
.17***	-.02	.05	.29***	.11**	.03	.19***	.19***	.43***	.23***	.20***	.42***	.48***	-	.63***	.64***
.19***	-.01	.19***	.11**	.51***	.04	.11**	.29***	.25***	.58***	.21***	.29***	.45***	.50***	-	.60***
.49***	-.05	.07	.06	.11*	.38***	.10*	.18***	.16***	.21***	.50***	.37***	.36***	.45***	.48***	-

Table C

Test Results of Longitudinal Configural and Weak and Strong Metric Equivalence of Six Latent Variables and Across Gender Including Information about Factor Loadings of the Parcels

		X^2	*df*	*p*	RMSEA
Depressive symptoms	Configural equivalence	215.38	120	<.001	.024
	Weak metric equivalence	259.96	132	<.001	.027
	Strong metric equivalence	336.50	144	<.001	.032
Gender	Configural equivalence	362.10	240	<.001	.028
	Weak metric equivalence	464.11	268	<.001	.033
	Strong metric equivalence	674.17	300	<.001	.043
Problem focusing	Configural equivalence	60.28	50	.152	.012
	Weak metric equivalence	70.76	58	.121	.013
	Strong metric equivalence	88.10	66	.036	.016
Gender	Configural equivalence	113.00	100	.176	.014
	Weak metric equivalence	149.76	119	.030	.020
	Strong metric equivalence	222.65	146	<.001	.028
Positive cognitive	Configural equivalence	57.78	50	.210	.011
Reframing	Weak metric equivalence	85.57	58	.011	.019
	Strong metric equivalence	239.55	66	<.001	.044
Gender	Configural equivalence	122.61	100	.062	.018
	Weak metric equivalence	168.32	119	.002	.025
	Strong metric equivalence	424.18	146	<.001	.053
Distraction	Configural equivalence	95.05	50	<.001	.026
	Weak metric equivalence	137.80	58	<.001	.032
	Strong metric equivalence	193.96	66	<.001	.038
Gender	Configural equivalence	147.58	100	.001	.027
	Weak metric equivalence	223.58	119	<.001	.036
	Strong metric equivalence	438.12	146	<.001	.055
Avoidance	Configural equivalence	48.62	50	.529	.000
	Weak metric equivalence	74.40	58	.072	.015
	Strong metric equivalence	234.90	66	<.001	.044
Gender	Configural equivalence	77.26	100	.955	.000
	Weak metric equivalence	123.30	119	.375	.007
	Strong metric equivalence	347.36	146	<.001	.045

					Standardized factor loadings			
RMSEA 90% CI	p(RMSEA)≤.05	CFI	ΔCFI	ΔRMSEA	mean	sd	min	max
.019 - .030	1.000	.994			.81	.05	.67	.88
.022 - .027	1.000	.992	.002	.003				
.027 - .036	1.000	.989	.006	.005				
.022 - .033	1.000	.993						
.028 - .038	1.000	.988	.005	.005				
.039 - .047	1.000	.978	.010	.010				
.000 - .023	1.000	.999			.87	.05	.76	.93
.000 - .022	1.000	.999	.000	.001				
.004 - .024	1.000	.998	.001	.003				
.000 - .025	1.000	.999						
.007 - .029	1.000	.998	.001	.006				
.020 -.035	1.000	.994	.004	.008				
.000 - .021	1.000	.999			.88	.04	.78	.94
.009 - .027	1.000	.998	.001	.002				
.038 - .050	.938	.988	.010	.025				
.000 - .029	1.000	.998						
.015 - .033	1.000	.997	.001	.007				
.047 - .059	.173	.980	.017	.028				
.019 - .034	1.000	.994			.70	.08	.58	.85
.022 - .032	1.000	.990	.004	.008				
.032 - .036	1.000	.983	.007	.006				
.017 - .035	1.000	.994						
.029 - .043	.999	.987	.007	.009				
.049 - .061	.095	.963	.024	.019				
.000 - .017	1.000	1.000			.78	.06	.64	.86
.000 - .023	1.000	.998	.002	.015				
.038 - .050	.955	.980	.018	.029				
.000 - .000	1.000	1.000						
.000 - .021	1.000	.999	.001	.007				
.039 - .052	.891	.976	.023	.038				

Table C
Continued

		X^2	*df*	*p*	RMSEA
Seeking support	Configural equivalence	76.22	50	.010	.020
	Weak metric equivalence	97.53	58	.001	.023
	Strong metric equivalence	226.51	66	<.001	.043
Gender	Configural equivalence	123.96	100	.052	.019
	Weak metric equivalence	226.02	119	<.001	.037
	Strong metric equivalence	347.36	146	<.001	.045

Table D
Unstandardized Associations between Study Variables and Covariates

	Age			Gender		
Measures	B	SE	*P*	B	SE	*p*
Depressive symptoms T1	.00	.01	.75	-.06	.02	.00
Depressive symptoms T2	.02	.01	.02	.03	.01	.04
Depressive symptoms T3	-.00	.01	.89	-.01	.01	.66
Depressive symptoms T4	-.01	.01	.28	.05	.02	.00
Depressive symptoms T5	-.01	.01	.59	.00	.01	.77
Problem Focusing T1	.01	.03	.75	-.06	.03	.05
Problem Focusing T2	.02	.03	.46	-.07	.03	.03
Problem Focusing T3	.03	.03	.34	-.11	.03	.00
Problem Focusing T4	-.04	.02	.08	-.06	.04	.11
Problem Focusing T5	.02	.03	.52	-.06	.04	.11
Positive Cognitive Reframing T1	.00	.01	.75	-.06	.02	.00
Positive Cognitive Reframing T2	.02	.01	.02	.03	.01	.04
Positive Cognitive Reframing T3	.00	.01	.99	-.01	.01	.63
Positive Cognitive Reframing T4	-.01	.01	.26	.04	.02	.00
Positive Cognitive Reframing T5	-.01	.01	.56	.00	.02	.83
Avoidance T1	-03	.03	.21	-.06	.03	.02
Avoidance T2	.02	.02	.37	.03	.02	.26
Avoidance T3	-.01	.03	.60	-.05	.03	.11
Avoidance T4	-.02	.03	.54	-.03	.02	.22

					Standardized factor loadings			
RMSEA 90% CI	p(RMSEA)≤.05	CFI	ΔCFI	ΔRMSEA	mean	sd	min	max
.010 - .028	1.000	.998			.89	.05	.81	.95
.014 - .030	1.000	.998	.000	.007				
.037 - .049	.977	.990	.008	.020				
.000 - .029	1.000	.998						
.029 - .044	.999	.993	.005	.018				
.039 - .052	.891	.976	.017	.008				

Condition			Education			Ethnicity		
B	SE	*P*	B	SE	*P*	B	SE	*P*
.01	.03	.69	-.01	.01	.37	.01	.02	.56
-.04	.04	.28	-.03	.02	.13	.00	.02	.87
-.07	.04	.12	.03	.01	.04	.00	.02	.98
.11	.05	.05	-.01	.02	.46	.02	.02	.38
.04	.04	.39	-.03	.02	.13	-.01	.02	.70
.10	.16	.54	.12	.03	.00	.09	.05	.07
-.27	.10	.01	-.00	.04	.95	-.01	.06	.90
.13	.06	.04	.01	.04	.87	.14	.05	.00
-.14	.10	.19	-.01	.04	.83	-.04	.05	.45
.16	.07	.03	.08	.04	.04	.03	.05	.63
.01	.03	.70	-.01	.01	.38	.01	.02	.56
-.04	.04	.31	-.03	.02	.13	.00	.02	.82
-.07	.04	.09	.03	.01	.06	.00	.02	.86
.11	.05	.05	-.02	.02	.42	.02	.02	.32
.04	.04	.38	-.03	.02	.10	-.01	.02	.80
-.04	.08	.64	-.08	.03	.01	.05	.04	.19
-.05	.12	.65	-.03	.03	.29	.02	.04	.55
-.06	.04	.08	-.02	.03	.44	.07	.04	.10
.01	.07	.86	-.03	.02	.16	.01	.03	.83

Table D
Continued

	Age			Gender		
Measures	B	SE	*P*	B	SE	*p*
Avoidance T5	.01	.03	.78	-.04	.03	.17
Distraction T1	-.02	.02	.41	.01	.03	.81
Distraction T2	-.02	.02	.33	.02	.03	.48
Distraction T3	.02	.02	.24	-.03	.03	.36
Distraction T4	-.04	.02	.10	.02	.03	.54
Distraction T5	-.01	.02	.53	-.01	.03	.72
Seeking Support T1	.04	.03	.26	-.32	.04	.00
Seeking Support T2	.00	.02	.89	-.22	.04	.00
Seeking Support T3	-.00	.03	.97	-.24	.04	.00
Seeking Support T4	-.03	.03	.41	-.09	.05	.04
Seeking Support T5	.02	.03	.43	-.10	.04	.02

Condition			Education			Ethnicity		
B	SE	*P*	B	SE	*P*	B	SE	*P*
.19	.11	.07	-.01	.03	.63	-.00	.04	.96
-.05	.10	.61	-.02	.03	.65	-.03	.04	.53
-.17	.11	.11	-.08	.04	.02	.01	.04	.78
-.02	.04	.67	-.03	.03	.23	.03	.03	.32
.00	.06	.97	-.06	.03	.02	-.01	-.03	.74
.17	.08	.04	-.04	.03	.19	-.04	.05	.39
.00	.13	.98	.06	.04	.13	-.07	.06	.20
-.08	.22	.71	-.06	.04	.16	.03	.06	.63
.03	.10	.78	-.04	.03	.21	-.04	.05	.37
-.20	.10	.05	-.04	.04	.33	-.01	.05	.80
.20	.11	.08	.06	.04	.13	-.10	.05	.05

Table E

Unstandardized Results of Cross-lagged Analyses between Coping Strategies and Depressive Symptoms

Model	Path	B	SE	*P*
1. Problem Focusing	PF1 – Dep2	-.01	-.01	.40
	Dep1 – PF2	-.23	.08	.00
	PF2 – Dep3	-.01	.01	.25
	Dep2 – PF3	-.29	.08	.00
	PF3 – Dep4	-.01	.01	.38
	Dep3 – PF4	-.24	.11	.03
	PF4 – Dep5	-.00	.01	.92
	Dep4 – PF5	-.14	.10	.17
2. Positive Cognitive Reframing	PCF1 – Dep2	-.01	.01	.22
	Dep1 – PCF2	-.20	.09	.02
	PCF2 – Dep3	-.02	.01	.08
	Dep2 – PCF3	-.19	.09	.03
	PCF3 – Dep4	-.01	.02	.58
	Dep3 – PCF4	-.16	.09	.08
	PCF4 – Dep5	-.00	.01	.75
	Dep4 – PCF5	-.04	.08	.61
3. Distraction	DS1 – Dep2	.00	.01	.92
	Dep1 – DS2	-.03	.06	.60
	DS2 – Dep3	.01	.02	.47
	Dep2 – DS3	.07	.06	.27
	DS3 – Dep4	.01	.02	.59
	Dep3 – DS4	-.17	.08	.04
	DS4 – Dep5	.03	.02	.18
	Dep4 – DS5	.05	.07	.51
4. Avoidance	AV1 – Dep2	.00	.01	.90
	Dep1 – AV2	-.07	.09	.40
	AV2 – Dep3	.02	.02	.43
	Dep2 – AV3	.11	.07	.09
	AV3 – Dep4	.02	.02	.33
	Dep3 – AV4	-.12	.08	.10
	AV4 – Dep5	.02	.02	.22
	Dep4 – AV5	.12	.08	.11

Table E
Continued

Model	Path	B	SE	*P*
5. Seeking support	SS1 – Dep2	-.01	.01	.49
	Dep1 – SS2	-.28	.11	.01
	SS2 – Dep3	-.03	.01	.00
	Dep2 – SS3	-.24	.09	.01
	SS3 – Dep4	.00	.01	.80
	Dep3 – SS4	-.17	.10	.09
	SS4 – Dep5	-.01	.01	.16
	Dep4 – SS5	-.13	.11	.22

Note. Dep = depressive symptoms, PF = problem focusing, PCF = positive cognitive reframing, AV = avoidance, DS = distraction, SS = seeking support.

Chapter 3

How to cope with perfectionism?

Perfectionism as a risk factor for suicidality and the role of cognitive coping in adolescents

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Abstract

Suicide among adolescents is a significant health concern. Gaining more knowledge about markers that contribute to or protect against suicide is crucial. Perfectionism is found to be a personality trait that is strongly predictive for suicidality; it can be divided into personal standards perfectionism (PS) and concerns about mistakes and doubts perfectionism (CMD). This study investigated the association between PS, CMD, and suicidality in a sample of 273 Dutch secondary school students aged between 12 and 15 years old (M = 13.54, SD = 0.58, 55.8% males). We also examined whether adaptive, or maladaptive cognitive coping strategies influenced these associations. We hypothesized that students high in PS or CMD would experience an increased suicidality. Moreover, we expected that adaptive coping strategies would act as buffer between the association of perfectionism and suicidality, and that maladaptive coping strategies would strengthen this association. For analyses, we used a regression model with latent variables. The results showed that higher scores in perfectionism (PS and CMD) were related to an increase in suicidality. High levels of maladaptive coping in combination with high levels of perfectionism were associated with an increase in suicidality. Although adaptive coping was related to a decrease in suicidality, adaptive coping in interaction with PS and with CMD was not a predictor of suicidality. The results are relevant for prevention, and intervention programs. This paper makes recommendations for clinical practice and further research in order to prevent suicidality in adolescents.

Introduction

Suicide among adolescents is a significant health concern as it is the second leading cause of death in 15–29 year-olds worldwide, and the leading cause of death in the Netherlands in this age group (CBS, 2018; WHO, 2018). Research shows that a history of suicide attempts and suicidal ideations is the best predictor of a suicide (Joiner, 2007). Suicidal ideation includes thoughts and intentions regarding suicide-related behavior. Suicide attempts include physical behavior in which an individual attempts to end his or her life, but survives (Kessler, Berglund, Borges, Nock, & Wang, 2005). The prevalence of suicidal ideations among youth is estimated as 11.4% in non-care populations and 24.7% in care populations (Evans et al., 2017), which is alarming as it is estimated that more than a third of adolescents who have suicidal thoughts continue to a suicide attempt (Nock et al., 2013). Approximately 11.2% of Dutch adolescents experience suicidal thoughts and 6.6% engage in deliberate self-harm or attempt suicide (Dijkstra, 2010).

Given the associations between suicidal ideation, suicide attempts, and a completed suicide, it is best to consider the process from suicidal thoughts and ideation to a suicide attempt as a continuum on which the risk for suicide increases as thoughts transform into actions (Joiner, 2007). Studies in this field use different synonyms to describe the process before suicide (e.g., suicidal thoughts and behavior, suicidal risk, or suicidality). In this present study, this continuum will be referred to as suicidality. It is crucial to gain more knowledge about markers that contribute to or protect against suicidality so that prevention can focus on identification of adolescents that are particularly at risk of suicidality. This study will examine the association between perfectionism and suicidality, and the moderating role of cognitive coping.

Perfectionism

A personality trait that is strongly predictive for suicidality is perfectionism (Johnson, Wood, Gooding, Taylor, & Tarrier, 2011; Smith et al., 2018). Perfectionism is defined as having high standards and being excessively self-critical of one's behavior (Frost et al., 1990; Hewitt & Flett, 1991), and can be divided into two dimensions: personal standards perfectionism (PS) and concerns about mistakes and doubts perfectionism (CMD; Stöber, 1998). PS represents the most prominent feature of perfectionism, which is the setting of unreasonably high standards and goals, also conceptualized as self-oriented perfectionism. CMD represents the overly critical evaluations of one's own behavior, including doubt about actions and overconcerns for mistakes, also conceptualized as socially prescribed perfectionism (Frost et al., 1990; Stoeber & Otto, 2006). To make conclusions more comparable, this study will adopt the two-factor model of perfectionism.

The relationship between CMD and suicidality has been studied in both adult and adolescent samples, and CMD proved to be a strong predictor of suicidal ideation (Flett, Hewitt, & Heisel, 2014; Hewitt et al., 2006; Roxborough et al., 2012; Shahnaz, Saffer, & Klonsky, 2018). Researchers argue that the association between CMD and suicidality may result from a shared symptom, which is a lack of self-disclosure. Adolescents at high risk of suicidality experience difficulties in exposing feelings and communicating thoughts to peers and family; this also applies for socially prescribed perfectionists who tend to hide behind a socially acceptable façade (Horesh, Zalsman, & Apter, 2004). Also, these perfectionists see the world as judgmental and are anxious not to disappoint others, which also makes them prone to suicidal ideation when experiencing interpersonal stressors such as romantic break-ups (Smith et al., 2016).

For a long period, the findings on the relationship between PS and suicidality were mixed (Flett, Hewitt, et al., 2014; O'Connor, 2007). Some studies report PS as positively related to suicidality (Flamenbaum & Holden, 2007; Smith et al., 2018), and others report PS as negatively related (Stoeber & Otto, 2006), or unrelated to suicidality (Hewitt, Caelian, Chen, & Flett, 2014; Hewitt, Norton, Flett, Callander, & Cowan, 1998). Recently, a meta-analysis by Smith et al. (2018) gave clarification on the PS and suicidality link, showing that both PS and CMD are related to suicidal ideation. More specifically, PS is associated with suicidal ideation, whereas CMD is associated with both suicidal ideation and suicide attempts.

Striving for success and setting high standards cannot alone predict suicidal ideation, it is the combination with a fear of failure and rigid thinking that puts these individuals at risk for suicidality. This is also reflected in psychological autopsy studies, where the majority of the people that died by suicide had very high expectations and demands of themselves, and any deviation from these standards was seen as a total failure (Center, 2007; Kiamanesh, Dyregrov, Haavind, & Dieserud, 2014; Törnblom, Werbart, & Rydelius, 2013). These studies also mentioned that most suicides are committed without a warning. Therefore, researchers warn against conceptualizing PS as healthy or normal perfectionism, because people high in PS try to maintain their invulnerable image and might not show visible signs of distress or suicidality (Hewitt et al., 2003; Smith, Vidovic, Sherry, & Saklofske, 2017).

Cognitive coping

Another factor that is frequently named in theoretical frameworks regarding suicidality is coping, and more specifically cognitive coping. Cognitive coping can be defined as the cognitive strategies people use to manage emotionally arousing stressors (Compas et al., 2001). Coping in the context of suicidality is described as a factor that, when maladaptive, makes it more likely that a feeling of entrapment arises (O'Connor & Kirtley, 2018). This is

based on studies showing that specific coping strategies such as rumination and limited problem-solving are associated with suicidality (Arie, Apter, Orbach, Yefet, & Zalzman, 2008; Morrison & O'Connor, 2008; Rogers et al., 2017).

Although there is little research on the relationship between cognitive coping and perfectionism, it seems that when people high in CMD respond to stressors with coping strategies that are considered as maladaptive (e.g., avoidance and rumination), they experience more depressive feelings or distress (Flett, Russo, & Hewitt, 1994; Park, Heppner, & Lee, 2010). In contrast, when these people use coping strategies that are considered as adaptive (e.g., positive reframing and humor), they experience less distress and more satisfaction (Stoeber & Janssen, 2011). In agreement, studies among preadolescents and adolescents, showed that adolescents with high PS and CMD used more dysfunctional coping strategies to cope with stress, and that this contributed to depressive symptoms (Dry, Kane, & Rooney, 2015; Flett, Druckman, Hewitt, & Wekerle, 2012). However, the relationship between perfectionism and coping is unstable. For example, research among adolescent athletes showed that high PS was related to more adaptive coping skills, whereas high CMD was related to poorer coping skills (Mouratidis & Michou, 2011).

Yet, research into the relationship between cognitive coping and suicidality is limited, especially in (early) adolescence. Moreover, research into the field of suicidality that includes interaction effects is lacking (Gooding et al., 2015). To our knowledge, the moderating function of coping in the perfectionism – suicidality link, is only examined in a sample of 547 Iranian students from the age of 19 to 24 (Abdollahi & Carlbring, 2017). This study examined adaptive and maladaptive perfectionism in relation to suicidal ideation and the moderating function of coping (task-focused, emotion-focused, and avoidance coping). Coping proved to be a significant moderator. Students high in adaptive or maladaptive perfectionism that used an increased task-focused coping style, were less likely to experience suicidal ideation compared to those with an increased emotion-focused and avoidance coping style. Regarding these results, it would be of added value to replicate this study in a Dutch sample among adolescents.

The aim of this study was to investigate the relationship between perfectionism and suicidality and the moderating role of cognitive coping. Based on previous research, we expected that more CMD would be associated with an increased suicidality. According to latest meta-analysis of Smith et al. (2018) regarding perfectionism and suicidality, we expected that more PS would be associated with increased suicidality. Furthermore, we expected that for adolescents with high levels of PS and CMD, adaptive coping strategies would buffer against suicidality. The use of maladaptive coping strategies was expected to have a strengthening effect on suicidality.

Method

Participants and procedure

Participants were 273 adolescents ranging in age from 12 to 15 years (M = 13.54; SD = 0.58) from five secondary schools across the Netherlands. All participants were Dutch speaking and 55.8% were male. The participating schools offered several levels of secondary education: pre-vocational secondary education (41.3%), higher general secondary education (40.9 %) and pre-university education (17.9%). School principals gave active consent for schools' participation. Parents received a letter that explained the purpose and method of the study one week before data collection and they gave passive consent. The questionnaire was administered at school during regular class hours. Participation was voluntary and participants were included through passive consent, but were allowed to withdraw from filling in the questionnaire at any point.

Measures

Perfectionism was measured with the Dutch version of the Frost Multidimensional Perfectionism Scale (Boone, Soenens, & Luyten, 2014; F-MPS; Frost et al., 1990). This 35-item questionnaire consists of six dimensions of perfectionism: personal standard (e.g., 'I set higher goals than most people'), concern over mistakes (e.g., 'I hate being less than the best at things'), organization (e.g., 'I am a neat person'), doubt about actions (e.g., 'I usually have doubts about the simple everyday things I do'), parental expectations (e.g., 'My parents set very high standards for me'), and parental criticism (e.g., 'My parents never tried to understand my mistakes'). Adolescents had to rate statements on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). For the purpose of this study, we derived two dimensions of perfectionism: PS and CMD. PS consists of the sum score of personal standards. CMD consists of the sum score of concern over mistakes and doubt about actions. The reliability and validity of the subscales of the F-MPS has been well established (Boone, Soenens, Braet, & Goossens, 2010; Dunkley, Blankstein, Halsall, Williams, & Winkworth, 2000; Dunkley, Blankstein, Masheb, & Grilo, 2006). The scales about parental expectations and criticism and organization were excluded because this was beyond the scope of this study. Cronbach's alpha was 0.77 for PS and 0.85 for CMD.

Suicidality was measured using the VOZZ-screen (Kerkhof, Huisman, Vos, & Smits, 2015). This questionnaire contains 10 questions assessing thoughts and actions about life, self-harm, suicide, and suicidal ideations in the past seven days. Items about a participant's life are rated on a 5-point scale from 1 (I totally agree) to 5 (I totally disagree) (e.g., 'I feel worthless'). Items about self-harm and suicide are rated on a 5-point scale from 1 (never) to 5 (very often) (e.g., 'I have harmed myself deliberately'). Items about suicidal ideation

in the past seven days are rated on a 5-point scale from 1 (never) to 5 (every day) (e.g., 'I thought that suicide would be a solution for my problems'). A sum score of 23 or above indicates high risk of suicide. Cronbach's alpha was 0.74.

Cognitive coping strategies were measured with the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij, & Spinhoven, 2002). This questionnaire consists of nine subscales comprising of four items each. Adolescents had to rate on a 5-point scale ranging from 1 (not at all) to 5 (a lot) to what extent they had used a particular strategy in response to stressful events. The CERQ contains the following subscales: catastrophizing (e.g., 'Again and again, I think about how terrible it all is'), acceptance (e.g., 'I think that I can't do anything about it'), other blame (e.g., 'I think that others are to blame'), positive refocus (e.g., 'I think about nicer things that have nothing to do with it'), positive reappraisal (e.g., 'I think that I can learn from it'), refocus on planning (e.g., 'I think of how I can best cope with it'), putting into perspective (e.g., 'I think that worse things can happen'), rumination (e.g., 'Again and again, I think about how I feel about it'), and self-blame (e.g., 'I think that it's my own fault'). We derived two dimensions for analyses. Maladaptive coping strategies consist of the sum scores of catastrophizing, other blame, rumination, and self-blame. Adaptive coping strategies consist of the sum scores of acceptance, positive refocus, positive reappraisal, planning, and putting into perspective (de Kruijff, Moussault, Plat, Hoencamp, & van der Wurff, 2019). The internal consistency of the subscales has proved to be good (Vanderhasselt et al., 2014). Cronbach's alpha was 0.85 for maladaptive coping strategies and 0.91 for adaptive coping strategies.

Strategy of analyses

To test the effect of perfectionism on suicidality and the moderating role of cognitive coping on the relationship between perfectionism and suicidality, we preferred to use latent variables. In this way, measurement errors of the latent variables in the regression models were part of the model, ensuring that relations between variables were more valid with greater theoretical meaningfulness (Kline, 2010). However, using the individual items (i.e., 10 for suicidality, 13 for CMD, 7 for PS, 16 for maladaptive coping strategies, and 20 for adaptive coping strategies), as indicators for the latent variables, would drastically increase the number of parameters to be estimated and decrease the power of the analysis. Therefore, we used parcels instead of the original items as indicators for the latent variables, and these were computed as the sum of a subset of items of a latent variable. PS was measured by two parcels; all other latent variables were measured by three parcels. The items of a latent variable were allocated to parcels according to the item-to-construct balance method (Little et al., 2002). For each latent variable an one-factor analysis was performed. The item with the highest standardized factor loading was allocated to parcel one, the item with the second highest loading to parcel two and the

item with the third highest loading to parcel three. The next three items were allocated to the parcels in reversed order, the item with the fourth highest loading to parcel three, the fifths highest loading to parcel two and the sixth highest loading to parcel one. Then the item with the seventh highest loading to parcel one, the eights highest loading to parcel two, etcetera. In this way the factor structure of the latent variable was reflected in each of the three parcels in an equivalent way. For the analyses we used Mplus (Muthén & Muthén, 1998-2015), a software package developed for the analysis of latent variables.

First, means, SDs, and correlations of the research variables are presented in the results section, including a difference test (Wald test) between boys and girls with the help of Mplus. To test the effect of perfectionism on suicidality, and the moderating role of cognitive coping, we used regression analysis with perfectionism, cognitive coping, and the interaction term perfectionism x cognitive coping, as predictors of suicidality. In the first step the effect of perfectionism on suicidality was estimated, in the second step the effect of cognitive coping on suicidality, and in the third step the interaction term was included as predictor of suicidality. Because latent variable interactions were highly non-normal, integration techniques were used in combination with a maximum likelihood estimator with robust standard errors, as described in Klein and Moosbrugger (2000). Fit indices, like CFI and RMSEA, and standardized regression coefficients of interaction terms, were not available for models with latent interaction terms. We tested the significance of the main effects and interaction effects with an (approximate) *z*-test by dividing the unstandardized regression weight B by the standard error SE(B), resulting in a *p*-value.

Results

First, we tested whether parcels adequately fitted to the data by testing a five factor model. The fit of this five-factor model was good, with CFI = 0.974 and RMSEA = 0.054. The 14 factor loadings varied between 0.72 and 0.91 (M = 0.82, SD = 0.05), indicating substantial loadings. Descriptive characteristics of the variables under study are presented in Table 1. All correlations were significant and positive ($p < 0.001$), except the correlation of CMD with adaptive coping strategies, and the correlation of adaptive coping strategies with suicidality. CMD and maladaptive coping strategies had substantial correlations with suicidality, while the correlation between PS and suicidality was small. The two perfectionism scales were reasonably interrelated, the correlation between the two coping strategies was a bit lower. PS had moderate correlations with adaptive and maladaptive coping strategies, while CMD was not significantly related with adaptive coping strategies, but substantial with maladaptive coping strategies. The mean score of suicidality falls far below the cut-off for severe suicidality. Eleven adolescents had a score of 23 or above, indicating a high risk for suicidality. Regarding self-harm, 5.5% of the adolescents reported having self-harmed once, and 3.3% several times. Suicidal ideation was experienced by 11.8% of the adolescents and two adolescents reported a suicide attempt.

With the Wald test we tested possible level differences between boys and girls. None of the five tests were significant, indicating no significant difference in mean levels between boys and girls for CMD, PS, maladaptive and adaptive coping strategies, and suicidality. In addition, we tested equality of correlation patterns for boys and girls by comparing the unconstrained covariances with the constrained covariances. The χ^2-difference test showed a nonsignificant difference ($\Delta\chi^2(10) = 16.98$, p = 0.075) indicating that the correlational patterns for boys and girls were not significantly different. Although beyond the scope of this study, we also observed the correlations between perfectionism, suicidality, and the single cognitive coping strategies. This correlation table is presented in Table A in the Appendix.

As shown in Table 2, CMD and the interaction between CMD and maladaptive coping were significant predictors of suicidality in Model 1. The significant interaction effect is explored in Figure 1, in which the predictors were divided into low (one SD below mean) and high (one SD above mean). Under the condition of low maladaptive coping, there was no relationship between CMD and suicidality. However, under the condition of high maladaptive coping, an increase in CMD was associated with an increase in suicidality. In Model 2, CMD and adaptive coping had significant effects on suicidality: more CMD was associated with higher suicidality and more adaptive coping was associated with lower suicidality. The interaction between CMD and adaptive coping was not a significant predictor of suicidality. In Model 3,

the initial significant effect of PS on suicidality disappeared in the second and third step. However, maladaptive coping and the interaction between PS and maladaptive coping were significant positive predictors of suicidality. The interaction effect in Model 3 is explored in Figure 2: under the condition of low maladaptive coping, the relationship between PS and suicidality was decreasing (if PS increased suicidality decreased), under the condition of high maladaptive coping, this relationship was increasing (if PS increased suicidality increased). In Model 4, PS and adaptive coping were significant predictors of suicidality: more PS was associated with higher suicidality and more adaptive coping was associated with lower suicidality. The interaction between PS and adaptive coping was not a significant predictor of suicidality.

Table 1
Correlations, means, and standard deviations of study variables

Variables	(1)	(2)	(3)	(4)	(5)
(1) PS	1	-	-	-	-
(2) CMD	.52***	1	-	-	-
(3) Adaptive coping strategies	.27***	.10	1	-	-
(4) Maladaptive coping strategies	.36***	.56***	.40***	1	-
(5) Suicidality	.25***	.55***	-.04	.43***	1
M	14.30	20.19	55.95	27.30	12.62
SD	4.65	6.50	14.60	7.82	3.59

*$p < .05$; ***$p < .001$.

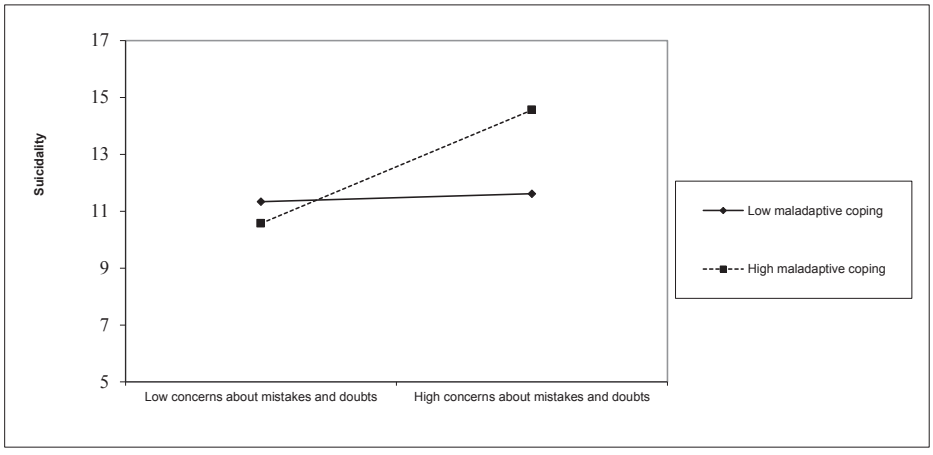

Figure 1. Interaction between CMD and maladaptive coping on suicidality.

Table 2

Regression analyses of CMD, PS, maladaptive coping, adaptive coping, and interaction effects on suicidality

	Step 1				Step 2				Step 3			
	B	*SE B*	*P*	R^2	*B*	*SE B*	*P*	R^2	*B*	*SE B*	*p*	R^2
Model 1												
CMD	.41	.05	**<.001**	.43	.38	.06	**<.001**	.44	.23	.07	**<.001**	.62
MC					.11	.11	.294		.12	.11	.298	
CMD x MC									.20	.05	**<.001**	
Model 2												
CMD	.41	.05	**<.001**	.43	.42	.05	**<.001**	.55	.42	.06	**<.001**	.55
AC					-.17	.07	**.020**		-.26	.11	**.016**	
CMD x AC									-.18	.10	.063	
Model 3												
PS	.38	.09	**<.001**	.09	.15	.10	.130	.23	.12	.12	.326	.65
MC					.52	.10	**<.001**		.37	.11	**.001**	
PS x MC									.67	.27	**.012**	
Model 4												
PS	.39	.09	**<.001**	.09	.46	.10	**<.001**	.12	.55	.18	**.003**	.19
AC					-.21	.10	**.035**		-.28	.14	**.045**	
PS x AC									-.22	.17	.206	

Note. MC = maladaptive coping; AC = adaptive coping.

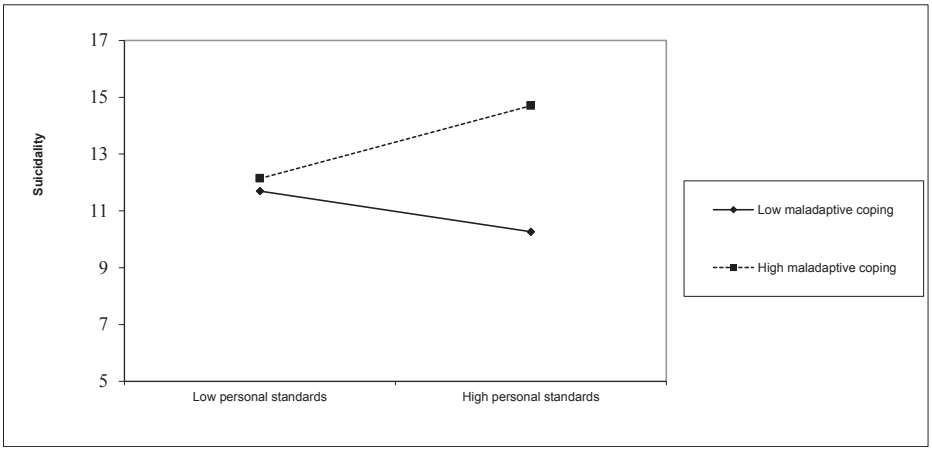

Figure 2. Interaction between PS and maladaptive coping on suicidality.

Discussion

The aim of the present study was to investigate the association between perfectionism and suicidality in early adolescents, and furthermore, the moderating role of cognitive coping on these associations. Based on the literature, it was expected that CMD and PS were positively related to suicidality. Moreover, adaptive coping (i.e., putting into perspective, planning, acceptance, positive refocus, and positive reappraisal) was expected to buffer the relationship between perfectionism and suicidality. Maladaptive coping (i.e., catastrophizing, other blame, rumination, and self-blame) was expected to strengthen the relationship between perfectionism and suicidality. Consistent with the hypotheses, both PS and CMD were positively associated with suicidality. High levels of maladaptive coping in combination with high levels of PS or CMD were associated with an increase in suicidality. Although adaptive coping was related to a decrease in suicidality, adaptive coping in interaction with PS and with CMD was not a significant concurrent predictor of suicidality.

The relationship between perfectionism and suicidality is in line with the meta-analysis of Smith et al. (2018) and findings of other empirical studies (e.g., Flamenbaum & Holden, 2007; Roxborough et al., 2012; Smith et al., 2017), in establishing the strong link between perfectionism and suicide. These findings imply that adolescents high in perfectionism might act and think in a way that reinforces suicidal ideation and behavior. Also, the findings were in line with most previous studies (Smith et al., 2018; Zeifman, Antony, & Kuo, 2020), indicating that PS was associated with an increase in suicidality.

The effect of maladaptive coping on the association between perfectionism and suicidality was in line with previous related studies (Arie et al., 2008; Flett et al., 1994; Morrison & O'Connor, 2008; Park et al., 2010; Rogers et al., 2017). Our findings suggest that a high level of maladaptive coping strategies is related to an increase in suicidality in adolescents with high levels of PS or CMD. Consequently, a lower use of maladaptive coping strategies was related to a decreased suicidality, suggesting that techniques aimed at reducing maladaptive coping strategies in perfectionistic adolescents could be helpful in reducing suicidality.

The absent buffering mechanism of adaptive coping strategies in the relationship between perfectionism and suicidality was unexpected. There are some explanations for the lack. First, the use of maladaptive coping might have a greater impact compared to the presence of adaptive coping. For example, one might have a high level of adaptive coping strategies but experience that these skills are overruled by ruminating thoughts. This explanation is partly supported by Thompson et al. (2010) who found that in a sample of depressed women, adaptive coping did not buffer the relationship between

maladaptive coping and depressive symptoms. They argue that individuals suffering from depression have more difficulties in using adaptive coping strategies due to the strong intensity of the maladaptive strategies. Others also found that depressed individuals have difficulties in ignoring or prohibiting negative thoughts (De Raedt & Koster, 2010). Nonetheless, more research is necessary if this supposed mechanism is to be applied in perfectionistic adolescents in relation to suicidality, because this study represents a non-clinical sample.

Second, an adaptive coping strategy that is frequently found to have a positive effect for individuals displaying suicidality is seeking social support (e.g., Babiss & Gangwisch, 2009; Farrell, Bolland, & Cockerham, 2015; Trujillo, Perrin, Sutter, Tabaac, & Benotsch, 2017). This specific strategy was not covered by the instrument we used to tap into coping. Other studies have shown that seeking support as a coping strategy would be especially beneficial for perfectionists as they are more likely to experience feelings of loneliness and interpersonal problems (Habke & Flynn, 2002; Sherry, Mackinnon, & Gautreau, 2015). We strongly suggest that future studies should include seeking support as a coping strategy when studying the relationship between perfectionism, suicidality, and coping, in order to draw firm conclusions.

Strengths and limitations

Several limitations of this study must be mentioned. First, the present study did not include an assessment of life stress, which is an important limitation because theoretical models describe perfectionism as a trait that can be harmful when activated by stress (O'Connor & Kirtley, 2018; Williams, 1997) and we were not able to control for this. Second, the use of a cross-sectional design limits the findings in this study as no conclusion can be made regarding cause and effect. Longitudinal design with multiple assessments over time would be very helpful to define and clarify the causal relationship between perfectionism, coping and suicidality. Furthermore, the present study did not include other important predictors in relation to suicidality, such as depression or hopelessness (Horwitz, Berona, Czyz, Yeguez, & King, 2017; Spirito, Valeri, Boergers, & Donaldson, 2003). It would be interesting to investigate the added value of perfectionism next to these predictors to demonstrate the value of targeting perfectionism in prevention and intervention. Also, it would be important to examine how perfectionistic thinking could lead to suicidal ideation. Probably, the presence of rigid thinking in combination with rumination strategies focused on a perfect image of the self will contribute to suicidality by increasing feelings of inadequacy and despair (Flett, Hewitt, Blankstein, & Gray, 1998; Flett, Hewitt, et al., 2014). Still, there is limited research on the presence of cognitive rigidity in people with strong perfectionistic characteristics and the relationship with suicidality.

Clinical implications

The findings in this study stretch the need for more attention to perfectionism in the prevention of suicidality in adolescents. To prevent suicidality in adolescence, it is important to check for perfectionistic traits in adolescents who are in a vulnerable situation and at risk of developing suicidality. People in distress who are characterized by CMD are especially at heightened risk for suicide attempts and specifically these CMD should be considered as a serious risk factor (Smith et al., 2018). In clinical practice, we see that prevention and treatment techniques are often focused on learning new, specifically adaptive, coping skills. Our findings suggest that learning new adaptive coping skills might be insufficient for these adolescents and that a more essential element of prevention and treatment should be learning to exclude or reduce maladaptive coping strategies, which is in line with Horwitz, Hill, and King (2011).

Despite the fact that perfectionism is known for its rigid thinking style and, therefore, hard to change, there are several treatment protocols that prove to be effective in reducing unhealthy forms of perfectionism (e.g., Egan et al., 2014). However, the long-term effectiveness of these protocols is unknown. Moreover, treatments that specifically target perfectionism in adolescents experiencing suicidal ideation have not yet been evaluated (Shafran & Mansell, 2001). Our study highlights the need for awareness of the risk of perfectionism in adolescents and encourages future studies to discover the clinical relevance of this among adolescents. Research in this age group is especially important as personality traits are developing and becoming more and more stable (McCrae & Costa Jr, 1994). This provides an opportunity for prevention and intervention to intervene in this process in order to develop healthy traits.

Appendix

Table A

Correlations between study variables (N = 273)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. CMD	-											
2. PS	.52***	-										
3. Suicidality	.55***	.24***	-									
4. Coping strategy Pref	.03	.15*	-.05	-								
5. Coping strategy Preap	-.00	.20**	-.15*	.51***	-							
6. Coping strategy Pip	.06	.19**	-.05	.46***	.61***	-						
7. Coping strategy Acc	.20**	.23***	.08	.42***	.49***	.56***	-					
8. Coping strategy Pla	.09	.28***	.02	.39***	.63***	.51***	.48***	-				
9. Coping strategy Sb	.42***	.28***	.34***	.13*	.23***	.31***	.48***	.37***	-			
10. Coping strategy Rum	.47***	.33***	.33***	.18**	.17**	.26***	.42***	.42***	.52***	-		
11. Coping strategy Cat	.42***	.16**	.39***	.07	.08	-.02	.27***	.10	.37***	.51***	-	
12. Coping strategy Ob	.34***	.32***	.17**	.20**	.18**	.20**	.30***	.23***	.34***	.30***	.34***	-

*$p < .05$; $p < .01$; ***$p < .001$.

Chapter 4

Evaluation of a school-based depression prevention program among adolescents with elevated depressive symptoms: Study protocol of a randomized controlled trial

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Abstract

Adolescents are at risk of developing depressive symptoms. Given the prevalence, recurrence and negative consequences of adolescent depression, it is crucial to implement prevention programs for high-risk adolescents. Prevention programs at an indicated level have shown to be successful in reducing depressive symptoms in adolescents. This study will evaluate the (cost)effectiveness of the prevention program 'Op Volle Kracht (OVK 2.0)' for adolescents with elevated depressive symptoms. We will perform a Randomized Controlled Trial (RCT) with an intervention and control condition to test the effectiveness of an indicated prevention program aimed at depression in adolescents. Adolescents in their second year of secondary education (11–15 year) will be screened for depressive symptoms. Those with heightened levels of depressive symptoms (CDI-2 ≥ 14) will be randomly assigned to the intervention (N = 80) or control group (N = 80). The participants in the intervention condition will receive a prevention program comprising eight meetings of 60 minutes each. The participants in the control condition will receive psycho-educational information. All participants and their parents will complete assessment at baseline, post-intervention, and 6-, 12- and 24- month follow-up. Primary outcome will be depressive symptoms. Additionally, the present study will identify mechanisms that mediate and moderate the program effects and test the effect of OVK 2.0 on secondary outcomes. This paper describes a study designed to screen adolescents for depressive symptoms and offer them a prevention program to prevent the onset of depressive symptomatology. Adolescents in the intervention condition are expected to show lower levels of depressive symptoms at 12 month follow-up compared to adolescents in the control condition. If OVK 2.0 proves to be effective, the screening and intervention program could be implemented in schools on a large scale.

Introduction

Depression is a major public health concern, causing an emotional burden for people and a considerable socio-economic burden for society. International studies show prevalence rates of depression between 2 and 5.6% in adolescents (Costello, Egger, & Angold, 2005; Costello, Erkanli, & Angold, 2006). A Dutch study showed that 5.6% of the adolescents experienced a depression before the age of 15 years (Monshouwer et al., 2012). Depressive symptomatology interferes with normal development and is associated with several negative outcomes, including other psychiatric disorders later in life (Fergusson & Woodward, 2002), educational impairments (Fletcher, 2008), self-injury (Giletta, Scholte, Engels, Ciairano, & Prinstein, 2012), and even suicide (Fried, Williams, Cabral, & Hacker, 2013). In addition to the individual consequences, depression has considerable economic and societal consequences. In 2003, healthcare costs for the treatment of depression were 660 million euros in the Netherlands (Meijer, Smit, Schoemaker, & Cuijpers, 2006). In 2005, the Dutch healthcare costs for the treatment of depression increased to 773 million euros (Poos, Smit, Groen, Kommer, & Slobbe, 2008). As the number of adolescents suffering from depression rises dramatically (Kessler, Avenevoli, & Merikangas, 2001), this might an appropriate phase in life to start with prevention.

Depression is one of the most prevalent mental disorders among adolescents, but it is often difficult to observe and therefore not recognized (Matthews, Hall, Vos, Patton, & Degenhardt, 2011). Research shows that depressive symptoms are unidentified more often in adolescents than in adults (Leaf et al., 1996). Adolescence is characterized by fluctuating symptoms, mood reactivity, and prominence of irritability. Additionally, other impairments, such as eating problems, anxiety, unexplained physical symptoms, truancy, or a decline in academic performance are often present and they can cover up depressive symptoms (Thapar, Collishaw, Pine, & Thapar, 2012). This is concerning, as an early onset of depressive symptoms and the duration of unidentified and untreated depression are both risk factors for severe depressive disorders in later life (Holzel, Harter, Reese, & Kriston, 2011). Further, this shows that adolescence in particular is the time to prevent the development of serious depression disorders. However, as adolescents are less willing to seek help for their mental health problems, especially when they experience subclinical symptoms (Rickwood, Deane, & Wilson, 2007), there is a need for an early identification and prevention strategy.

Over the past years, several programs aimed to prevent depression among adolescents have been developed. These programs are based predominantly on the principles of cognitive behavioral therapy (CBT). In accordance with Beck's cognitive theory, they assume that negative cognitions and cognitive distortions increase depressive symptoms and that reappraising and correcting misinterpretation diminish depressive symptoms (Beck, 1976).

In these prevention programs, adolescents learn to recognize cognitive biases and change negative thoughts into more helpful thoughts that make them feel better. The existing research shows that these programs have small to moderate effect sizes in reducing depressive symptoms (Horowitz & Garber, 2006; Merry et al., 2011) or prevent the onset of a depression (Cuijpers et al., 2008). Prevention can be divided into three different levels; (1) universal prevention focused on the entire population, (2) selective prevention focused on high risk individuals, and (3) indicated prevention focused on individuals with early symptoms of a disorder (Mrazek & Haggerty, 1994). Research to date shows that indicated prevention targeting adolescents with subclinical depressive symptoms proves to be more effective in preventing the development of adolescent's depression compared to universal prevention programs (Horowitz & Garber, 2006; Merry et al., 2011; Stice, Shaw, Bohon, Marti, & Rohde, 2009).

In the Netherlands, the effectiveness of depression prevention is examined with the prevention program 'Op Volle Kracht' (OVK), which translates to 'On Full Power'. OVK is the Dutch version of the Penn Resiliency Program (Gillham, Reivich, Freres, Chaplin, Shatte, et al., 2007) that has proven to be successful in reducing depressive symptoms (Brunwasser, Gillham, & Kim, 2009). This program was designed for adolescents aged 12 to 14, and it includes CBT, cognitive coping skills, and social skills. The effectiveness of OVK has been studied through randomized controlled trials at universal- selective-, and indicated-prevention level. Consistent with the previous analyses, OVK was not effective at universal level (Tak, Lichtwarck-Aschoff, Gillham, Van Zundert, & Engels, 2016) and selective level (Kindt, Kleinjan, Janssens, & Scholte, 2014). However, OVK was effective at an indicated level among adolescents girls (Wijnhoven, Creemers, Vermulst, Scholte, & Engels, 2014) when it included only the first eight lessons based solely on CBT techniques. This is in line with Stice et al. (2009) who showed, that longer prevention programs lead to less positive outcomes. Moreover, the focus on CBT might be more effective than the combination of several techniques.

The present study proposes to screen adolescents for depressive symptoms and suicidal ideations, offer them a prevention program to prevent the onset of depression, and evaluate the (cost) effectiveness of this prevention program. To achieve these aims, this study will use the modified OVK version comprising 8 lessons of Wijnhoven et al. (2014) that is adapted to an up to date version with a focus on high-risk adolescents and is therefore called OVK 2.0. The effectiveness of OVK 2.0 compared to psycho-education will be examined in a randomized controlled trial with follow-up assessments up to 24 months. An intensive collaboration between schools and (mental) health care organizations has already begun in a rural area in the south of the Netherlands to test the effectiveness of OVK 2.0. In addition to the primary aims of present study, factors that might influence

the effectiveness of OVK 2.0 will be investigated. Although various studies examined the effectiveness of depression prevention programs, mechanisms underlying the effectiveness are still unknown. It is important to identify these factors, as this provides insight into the development of depressive symptoms among adolescents and directions for further improvement of the working mechanisms of prevention programs.

First, mediation effects will be investigated. Previous research showed that a ruminative response style worsens the depressive feelings (Nolenhoeksema, Morrow, & Fredrickson, 1993). Furthermore, it is crucial to investigate the effect of prevention on rumination and other cognitive coping styles, as this might influence the prevention effectiveness and the course of depressive symptoms. Another possibly mediating factor that will be included in this study is perfectionism. Adolescents with depressive symptoms are more likely to perceive that others have high standards for them; thus, they feel they must satisfy those standards (Asseraf & Vaillancourt, 2015). CBT techniques might teach adolescents to cope with irrational perceptions, which might decrease their scores on perfectionism and depressive symptoms. In addition, the presence of negative life-events will be included as a mediator. Life events can be divided into dependent and independent life-events. Dependent life-events are mostly interpersonal (e.g,. conflicts; Hammen, 2005). Independent life-events refer to events on which one has no influence (e.g., divorce of parents). Individuals suffering from a depression experience more dependent negative events, and these events are highly predictive of depressive symptoms in adolescence (Auerbach, Bigda-Peyton, Eberhart, Webb, & Ho, 2011). A prevention program might increase coping skills, which might affect the presence of dependent life events that might in turn decrease depressive symptoms.

Second, certain moderators, such as age and gender, might influence the outcomes of this study; therefore, they will be examined. Based on previous meta-analyses of CBT prevention programs, larger effects are expected for girls and older adolescents (Horowitz & Garber, 2006; Stice et al., 2009). Adolescent girls are more likely to develop a major depression (Hankin et al., 1998) and report greater depressive symptoms compared to adolescent boys (e.g., Castelao & Kroner-Herwig, 2013). This might be the reason that girls are more susceptible for intervention effects. Additionally, older adolescents may struggle less to acquire the skills due to cognitive maturation (Jernigan, Trauner, Hesselink, & Tallal, 1991). It is important to understand the role of moderators to identify adolescents who benefit the most from the intervention and adolescents who are unlikely to benefit from the intervention (Kazdin & Nock, 2003).

Third, a prevention program might also affect secondary outcomes that are highly correlated with depressive symptoms, such as suicide risk. Since 2010, suicide has been the most significant cause of death among 15 to 29 years old individuals in the Netherlands

(Gijzen, Boere-Boonekamp, L'Hoir, & Need, 2014). Moreover, untreated depression is one of the most frequently reported risk factors associated with adolescents' suicide (e.g., Fried et al., 2013). Strikingly, research shows that only a minority of the adolescents who committed suicide was receiving psychiatric treatment at the time of death (Portzky, Audenaert, & van Heeringen, 2005). The effect of OVK 2.0 on suicide risk might be relevant, as suicide has a massive influence on people and society. Other secondary outcomes included in the present study are anxiety (Kessler et al., 1994), somatic complaints (Bohman et al., 2010), and academic performance (Fletcher, 2008). Additionally, cost-effectiveness, parents' reports of depressive symptoms, and the prevention of a clinical depression are included.

Method

The study design will be reported in accordance with the CONSORT 2010 statement for reporting parallel group randomized trials (Schulz, Altman, & Moher, 2010). The medical ethics committee CMO Region Arnhem-Nijmegen in The Netherlands approved this study (NL55328.091.15). The study is registered in the Dutch Trial Register for RCT's (NTR5725).

Design

The present study will be a non-blinded randomized controlled trial (RCT) with two conditions (intervention versus control). The participants in the intervention condition will receive a CBT-based prevention program and participants in the control condition will receive psycho-education. Participating schools are located in a rural region in the south of the Netherlands. Students in their second year of secondary school, from vocational training up to pre-university level, will be screened for depressive symptoms using the Dutch version (Bodden, Braet, & Stikkelbroek, 2016) of the Childhood Depression Inventory 2 (CDI-2; Kovacs, 2011). This screening is part of a large health survey that is occupied by the public health service in schools (in Dutch: GGD). Adolescents with elevated symptoms of depression will be selected and recruited. Those who will be identified with suicidal ideation during the screening or at any time point during the study will be seen within 48 hours by the public health service of school. Eventually, clinical referrals will be provided and these adolescents will be excluded from the intervention. However, they will be asked to complete the same set of questionnaires as the participants in the intervention and control condition to examine the effect of the screening and referral.

After the screening and recruitment, participants will be randomly assigned to the intervention or control group. Adolescents and their parents will complete a set of questionnaires at baseline (T0). Furthermore, adolescents will undergo a semi-structured interview (ADIS-C; Siebelink, Treffers, & De Ryke, 2001) to determine the presence of clinical depression. The assessments to evaluate the effects of the intervention will be conducted immediately after the intervention (T1) and at 6- (T2), 12-(T3), and 24- month follow-up (T4). The clinical interview will be repeated at 6-month follow-up. Figure 1 shows a schematic overview of the design of the present study.

If severe depressive symptoms will be identified during the 6-month follow-up interview, appropriate clinical referrals will be provided for adolescents in either condition. The severity of depressive symptoms will be determined on the clinical guidelines for depression and youth in the Netherlands (Trimbos-Institute, 2009). The criteria include impairment in social functioning, the number of symptoms of a clinical depression according to the DSM-IV, suicidal ideation, psychotic symptoms, and course and characteristics of the depression.

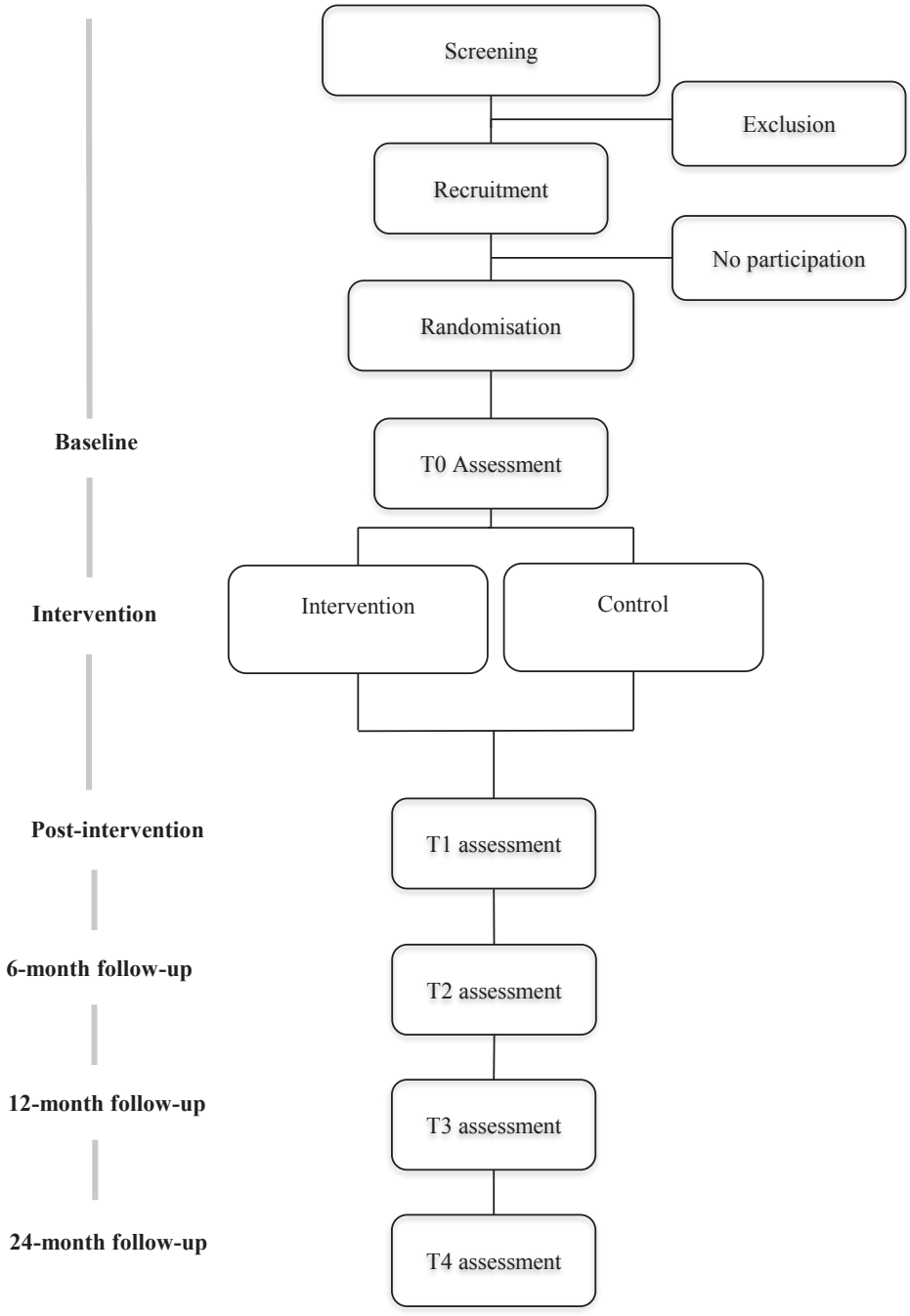

Figure 1. Schematic overview of the study design.

Participants' eligibility

Adolescents with elevated depressive symptoms (score ≥ 14 CDI-2; Bodden, Braet, et al., 2016) are eligible for this study. Inclusion criteria are aged 11 to 15 years old and sufficient knowledge of the Dutch language. Exclusion criteria are the absence of parental permission and already undergoing a treatment for mood problems.

Recruitment

Students who will meet the eligibility criteria (score ≥ 14 CDI-2) will receive verbal and written information about the study and written informed consent from adolescents and parents will be obtained. Subsequently, an independent researcher will randomly assign participants to one of the two conditions. Randomization will be carried out within schools to control for school characteristics.

Adolescents with suicidal ideation during the screening or at any time point within the study (score 2 on CDI-2 item: a desire to kill oneself, if given the chance and/or score ≥ 23 on the VOZZ-Screen) will be seen by a public health service professional at the school. Parents will be contacted and information about possible mental health care services will be provided.

Sample size

The sample size is based on the expected difference (Cohen's d = 0.25) in the primary outcome between the experimental and control condition at 12 months follow-up (based on a meta-analytic review; (Horowitz & Garber, 2006). To detect significant differences between subjects (condition effect), a total sample size of 78 (39 in each condition) is needed, assuming type I error of 0.50 and type II error of 0.20 (power = 0.80). Potential loss of power due to data clustering has to be considered, since the intervention will be conducted in small groups, with the mean of 7 children in each group. Therefore, the ICC (estimated at 0.07 based on the results of Wijnhoven et al. (2014) needs to be incorporated into the sample size calculation. The Variance Inflation Factor (VIF; Campbell, Thomson, Ramsay, MacLennan, & Grimshaw, 2004) equals 1.49, indicating that the sample size must be increased to 117. We intend to increase the sample size by 40% to compensate for the potential loss of power and drop-out, resulting in 160 participants (80 in experimental condition and 80 in control condition).

CBT Intervention

The intervention will be based on the principles of CBT. In the first lesson, the participants will learn about emotions and depressive feelings. The adolescents will learn to identify emotions and thoughts they experience. During this program, they will use a schedule to learn that activating events, beliefs, emotional consequences and behavioral consequences

are related. In the second lesson, the adolescent will learn about the relationships among activating events, beliefs, and emotional consequences. Beliefs can be optimistic or pessimistic and play a major role in the emotional consequences. The adolescents will also learn to recognize pessimistic beliefs. In the third lesson, adolescents will learn how to recognize cognitive errors. In the fourth lesson, adolescents will learn to investigate their thoughts and to find evidence for and against their thoughts. In the fifth lesson, adolescents will continue to find evidence for and against their thoughts and will start to test whether their thoughts are actually true. In the sixth lesson, participants will investigate theirs thoughts by asking the question 'what's next?'. They will learn to question their thoughts by imagining the worst case scenarios of their thoughts. In addition, they will learn to create an action plan to prevent the worst case scenario from actually happening. In the seventh lesson, adolescents will learn to replace thoughts and prove that the alternative belief is true. The eight and last lesson is meant to finish the intervention in a fun way. Adolescents can share their experiences with the intervention and take a quiz on everything they learned. In addition to the lessons, adolescents will monitor and record their mood daily, during the intervention. Homework will include energizing assignments based on behavioral activation which are assumed to have a positive effect on adolescents' mood (e.g., Ruggiero, 2005).

OVK 2.0 is a modified and more up to date version of the OVK program. It consists of 8 lessons of 60 minutes each instead of the original 16 lessons. The program will be based solely on CBT techniques, which will be covered during the first 8 lessons of OVK. Lessons 9 to 16 of the OVK program will focus on social and cognitive coping skills, self-esteem, problem solving, and decision making, which are not included in OVK 2.0. In the original OVK program, homework was used to practice techniques learned in the lessons. Homework in OVK 2.0 will include mood monitoring and energizing assignments. Additionally, multi-media sources, such as video fragments, and a quiz to which the adolescents will have to respond using their phones, will be used in OVK 2.0.

The program will be delivered by licensed psychologists that are also staff members at school, together with a co-trainer. This co-trainer could be someone of the collaborated (mental) health care organizations or a staff member at the school. They will receive a 3-day training program covering training in CBT skills, theoretical principles, and the intervention protocol. The training will be delivered by licensed and experienced psychologists. Trainers and co-trainers will receive a detailed manual of OVK 2.0 and are offered support by the research team. After each lesson, trainers will complete an integrity checklist to improve intervention fidelity.

Psycho-education

The psycho-education condition consists of providing a brochure with information about depressive symptoms. Additionally, participants will receive two e-mails with useful tips to boost their mood and decrease depressive symptoms. For example, they are encouraged to do more physical exercises and to find a sport they might like.

Study outcome measures

Table 1 shows an overview of the study outcome measures that will be assessed at each time point.

Table 1
Overview of the assessment

	Screening	T0	T1	T2	T3	T4
Adolescent						
Depression (CDI-2)	X	X	X	X	X	X
Depression disorder (ADIS-C)		X		X		
Suicide risk (VOZZ-Screen)		X	X	X	X	X
Health status (EQ-5D-5L)		X	X	X	X	X
Anxiety (STAI)		X	X	X	X	X
Somatic symptoms (CSI)		X	X	X	X	X
Perfectionism (MPS)		X	X	X	X	X
Coping (CERQ)		X	X	X	X	X
Life-events (ALEQ-R)		X	X	X	X	X
Parents						
Depression (CDI-2)		X	X	X	X	X
Healthcare costs (TIC-P)		X	X	X	X	X
School						
Academic grades		X	X	X	X	X
Drop-out rates		X	X	X	X	X
Non-attendance		X	X	X	X	X
Truancy		X	X	X	X	X

Screenings measures

To assess the eligibility, adolescents will be screened for depressive symptoms using the CDI-2 (Bodden, Braet, et al., 2016; Kovacs, 2011). The CDI-2 is a self-report questionnaire comprising 28 items, each consisting of three statements rated in severity from 0 to 2 (e.g.,

'I don't feel alone' = 0, 'I often feel alone' = 1, 'I always feel alone' = 2). Item 8 of the CDI-2 measures the presence of suicidal ideation on a three point scale (0 = I don't think about ending my life, 1 = I think about ending my life, but I would never do it, 2 = I want to end my life). The CDI-2 will be used for screening purposes in accordance with the Dutch clinical guidelines for depression among youth (Trimbos-Institute, 2009).

Primary outcome measure

Depressive symptoms in children and adolescents will also be measured with the CDI-2 (Bodden, Braet, et al., 2016; Kovacs, 2011), as described in previous section.

Secondary outcome measures

The presence of a clinical depression will be measured by the Anxiety Disorder Interview Schedule for Children (ADIS-C; Siebelink et al., 2001) during a clinical interview. This semi-structured diagnostic interview can be used to diagnose anxiety and comorbid disorders in 7 to 17 years old children. The interview will be administered by a qualified psychologist or by a master student under the supervision of a qualified psychologist. The present study will focus only on affective disorders. Participants will have to respond 'yes', 'no' or 'different' to standardized questions. The purpose of this interview will be to investigate whether children meet the criteria for depression. If participants meet the criteria for depression, the severity will be determined using the checklist of the clinical guidelines for depression and youth (Trimbos-Institute, 2009).

Suicide risk will be measured using the Vozz-screen (Kerkhof et al., 2015). This questionnaire contains 10 questions assessing thoughts and actions about life, self-harm, suicide, and suicidal ideations in the past seven days. Items about participant's life are rated on a 5-point scale from 1 (I totally agree) to 5 (I totally disagree) (e.g., 'I feel worthless'). Items about self-harm and suicide are rated on a 5-point scale from 1 (never) to 5 (very often) (e.g., 'I have harmed myself deliberately'). Items about suicidal ideation in the past seven days are rated on a 5-point scale from 1 (never) to 5 (every day) (e.g., 'I thought that suicide would be a solution for my problems'). A score of 23 or above indicates high risk of suicide.

Health care costs will measured with the child version of the Trimbos and Institute of Medical Technology Assessment Cost Questionnaire for Psychiatry (TIC-P; Bouwmans, Schawo, & Hakkaart-van Roijen, 2012; Hakkaart-van Roijen et al., 2007). This questionnaire contains 33 items designed to measure the direct and indirect costs of mental health problems. Parents register the number of hospital days, general practice visits, sessions with psychologists, and other relevant events in the past three months. The indirect costs include the number of 'work loss' days for parents and school absenteeism for adolescents.

Health status will be measured using the EQ-5D-5L questionnaire which provides a single index value for health status that can be used to investigate the cost-effectiveness of the intervention (Group, 1990). It comprises five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Every dimension contains five statements, and participants are asked to rate their health on each dimension by choosing the statement that fits them the best. The total score can be compared with the health status by the general population (Dolan, 1997), and for each health status, a quality of live score can be calculated. This score can vary from -0.59 (worst possible health status) to 1 (best possible health status). These scores will be used to calculate the Quality Adjusted Life Years (QALY).

Anxiety will be measured with the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1970b). This self-report questionnaire contains 20 items measuring state anxiety. Items are rated on a 4-point scale, with scores ranging from 0 (almost never) to 3 (almost always) (e.g., 'I feel nervous').

Academic performance, including academic grades, drop-outs, non-attendance, and truancy will be obtained in collaboration with the schools.

Somatic symptoms will be measured with the 35-item Children's Somatization Inventory (CSI; Meesters, Muris, Ghys, Reumerman, & Rooijmans, 2003; Walker & Garber, 1992). Adolescents have to rate whether they have been bothered by somatic symptoms in the last two weeks on a 5-point scale ranging from 0 (no suffering) to 4 (many suffering) (e.g., 'Headache' or 'Fainting spells').

Perfectionism will be measured using the Frost Multidimensional Perfectionism Scale (FMPS; Boone et al., 2014; Frost, Marten, Lahart, & Rosenblate, 1990). This 35-item questionnaire consists of six dimensions of perfectionism: personal standard (e.g., 'I set higher goals than most people'), concern over mistakes (e.g., 'I hate being less than the best at things'), organization (e.g., 'I am a neat person'), doubt about actions (e.g., 'I usually have doubts about the simple everyday things I do'), parental expectations (e.g., 'My parents set very high standards for me'), and parental criticism (e.g., 'My parents never tried to understand my mistakes'). Adolescents will have to rate statements on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Cognitive coping strategies will be measured with the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij, et al., 2002). This questionnaire consists of 9 subscales comprising of 4 items each. Adolescents will have to rate on a 5-point scale ranging from 1 (not at all) to 5 (a lot) to what extent they had used this strategy in response to stressful events. The CERQ contains the following subscales: catastrophizing (e.g., 'Again

and again, I think about how terrible it all is'), acceptance (e.g., 'I think that I can't do anything about it'), other blame (e.g., 'I think that others are to blame'), positive refocus (e.g., 'I think about nicer things that have nothing to do with it'), positive reappraisal (e.g., 'I think that I can learn from it'), refocus on planning (e.g., 'I think of how I can best cope with it'), putting into perspective (e.g., 'I think that worse things can happen'), rumination (e.g., 'Again and again, I think about how I feel about it'), and self-blame (e.g., 'I think that it's my own fault').

Negative life events will be measured with the Dutch translation of the Adolescent Live Event Questionnaire-Revised (ALEQ-R; Auerbach et al., 2011; Kindt et al., 2014). The questionnaire contains 29 items assessing how often the dependent and independent negative life events occurred during the past 3 months on a five-point scale ranging from 0 (never) to 5 (always; e.g., 'You got in trouble with the teacher or principal').

Depressive symptoms according to parents will be measured with the Dutch translation of the CDI-2 (Bodden, Braet, et al., 2016; Kovacs, 2011). The questionnaire contains 17 items measured on a 4-point scale from 0 (not at all) to 3 (almost always) (e.g., 'My child seems lonely'). Parents will have to rate the extent to which the items are in accordance with their child's thoughts and feelings.

Data analysis/statistical analysis

The data will be analyzed according to the intent-to-treat principle. Multiple imputations will be used to handle missing values at post-intervention and follow-up measurements. The results of the study will be reported in accordance with the CONSORT Statement (Schulz, Altman, & Moher, 2010).

To test the differences in the development of depressive symptoms between participants in the experimental and participants in the control group, a 5 (within subjects: pre, post, 6-, 12-, 24 follow-up) by 2 (experimental vs. control) two-way mixed ANOVA (repeated measures) will be conducted with depressive symptoms (adolescent report) as the dependent variable. To examine and test change in depressive symptoms over time, we will use Latent Growth Curve Modeling with Mplus (Muthen & Muthen, 1998-2012). Growth parameters (intercepts, linear slopes and possible quadratic terms) will be estimated and condition will be included as a predictor to test the effect of condition on these parameters. The Full Information Maximum Likelihood estimator is sufficient to deal with missing values (Enders, 2010; Johnson & Young, 2011).

To test the mediating role of perfectionism, life events and cognitive coping style, mediation analyses will be performed in Mplus (Muthen & Muthen, 1998-2012). The indirect effects will be tested with bootstrap methods. To examine how parameters moderate the effect of condition on the growth parameters of depressive symptoms, the moderators will be included as covariates separately. The treatment effects of OVK 2.0 on secondary outcomes will be investigated in the same way as the primary study parameter, that is, depressive symptoms. Additionally, remission rates of the depression disorders that were diagnosed at baseline (with ADIS-C) will be calculated at 6-months follow-up, and Chi-square (χ^2) tests will be conducted to compare remission rates between the experimental and control group.

In the economic evaluation study, we will use incremental-cost ratios in which we compare, incremental costs and incremental outcomes of the OVK 2.0 intervention in relation to psycho-education (control group). Arithmetic mean cost differences are the most appropriate measures to describe cost data. Because cost data do not conform to the assumptions of standard statistical test we will use bootstrapping resample methods (Ramsey et al., 2005) to test statistical differences between the intervention and the control group. The maximum amount of budget that society is prepared to pay to improve the treatment effectiveness determines the choice of treatment.

Discussion

The present study protocol gives an overview of a RCT on the effect of OVK 2.0 on depressive symptoms in adolescents in a school-based setting. The primary aim is to investigate the effectiveness of an indicated depressive prevention program OVK 2.0 in adolescents. It is hypothesized that adolescents in the intervention condition will show less depressive symptoms during follow-up assessments, compared to the adolescents in the control condition receiving psycho-educational information. The secondary and third aims are to investigate factors that possibly mediate (cognitive coping style, perfectionism, negative life-events) and moderate the effect (age and gender) of the prevention program. The fourth and last aim is to test the effect of OVK 2.0 on secondary outcomes. The present study will investigate whether OVK 2.0 affects the following outcomes: cost-effectiveness, suicide risk, anxiety, somatic complaints, academic performance, adolescent's depressive symptoms according to parents, and the presence of a clinical depression.

Strengths and limitations

One of the strengths of this study is that it will include long term follow-up assessments of up to 24 months, providing the opportunity to evaluate the long-term effects. Second, the program will be implemented in all secondary schools in a rural region in The Netherlands with a strong collaboration between schools' and (mental) health organizations. A meta-analysis of Brunwasser and Garber (2015) on the effectiveness of programs for the prevention of youth depression revealed the need for studies conducted in real-life conditions. The present study will be relevant to the discussion about practical implementation. Third, parents' assessments of adolescents' depressive symptoms and a clinical interview will be conducted to supplement the information gathered exclusively from self-reports. The addition of a semi structured interview gives the opportunity to identify the presence or absence of a clinical depression in a more objective manner and enable us to investigate whether the intervention is successful in the prevention of a depression disorder. Fourth, in contrast to most RCT studies, not only the effectiveness of the prevention program will be evaluated, but also cost-effectiveness will be taken into account. This will be of great importance for the rising healthcare costs.

Several limitations of this study must be noted. The project will focus on adolescents with elevated depressive symptoms only. This might lead to a stigmatization effect during the process of identification and participation in the prevention program. Moreover, the study will be conducted in a specific region in The Netherlands, which may limit the generalizability of the results to other regions in The Netherlands.

Implications for practice

If the OVK 2.0 program proves to be effective in preventing depressive symptoms in adolescents, it will have positive effects on the adolescents and society in general. Adolescents will experience less depressive symptoms, and the implementation of early identification and prevention could reduce the number of adolescents with a clinical depression. In addition, if the prevention program proves to be cost-effective, it will give the opportunity to lower health care costs associated with depression. Furthermore, the results of the study can increase our knowledge of the mechanisms that underlie the development of depressive symptoms in adolescents. This would enable us to improve prevention programs for adolescents with depressive symptoms. Additionally, OVK 2.0 might affect other depression-related symptoms, such as anxiety or somatic complaints, which will further benefit adolescents' (mental) health. Lastly, OVK 2.0 might be a suitable example for early detection and treatment that could be easily implemented in the school system, which might be an answer to the increasing number of young people experiencing depression.

Chapter 5

Randomized control trial testing the effectiveness of implemented depression prevention in high-risk adolescents

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Abstract

Adolescent depression is a global mental health concern. Identification and effective prevention in an early stage is necessary. The present randomized, controlled trial aimed to examine the effectiveness of Cognitive Behavioral Therapy (CBT) based depression prevention in adolescents with elevated depressive symptoms. This prevention approach is implemented in school communities, which allows to examine effects under real-life circumstances. A total of 5,222 adolescents were screened for elevated depressive symptoms in the second grade of secondary schools; 130 adolescents aged between 12 and 16 years old (M = 13.59; SD = 0.68; 63.8% girls) were randomly assigned to the experimental (OVK 2.0) or control condition (psycho-education). Self- and parent-reported depressive symptoms were assessed at pretest, post intervention, as well as 6- and 12-months follow-up. Clinical assessment of depression was assessed at pretest and 6-months follow-up. Intent-to-treat analyses revealed that the decrease in adolescent-rated depressive symptoms was significantly larger in the intervention condition than in the control condition. There was no significant difference in decrease of parent-rated depressive symptoms between both conditions. Based on the findings, we recommend the implementation of screening and prevention in schools, according the basics of this study design. Since this is a new step forward, we discuss the clinical impact, challenges, as well possibilities for future research.

Introduction

Depression is a common disorder that affects millions of people worldwide, and which is nowadays the leading cause of disease burden, according to the World Health Organization (WHO, 2019). The onset of a depression often starts in adolescence with rates that increase substantially between 13 and 18 years of age (Kessler, Berglund, et al., 2005). In the Netherlands, the life time prevalence of a depressive disorder in this age group is 15.5%, and 8.8% experienced a depressive disorder in the past 12 months (Ormel et al., 2015). The early onset of depression, but also the presence of subclinical depression, affect academic and interpersonal functioning and are associated with other psychopathology, such as substance use, anxiety, and suicidality (Avenevoli et al., 2015; Carrellas, Biederman, & Uchida, 2017; Melton, Croarkin, Strawn, & Mcclintock, 2016; Schuler, Vasilenko, & Lanza, 2015). On the longer term, depression in adolescence is often linked to recurrent and chronic depressive episodes in adulthood (Johnson, Dupuis, Piche, Clayborne, & Colman, 2018; Rao, Hammen, & Daley, 1999).

Consequently, prevention programs for adolescents receive growing attention. Several prevention programs worldwide were developed and examined on three levels: 1) universal prevention, which is aimed at all individuals; 2) selective prevention, which is aimed at individuals at risk for depression; and 3) indicated prevention, which is aimed at individuals with elevated depressive symptoms (Hetrick et al., 2016). Overall, meta-analyses have established that depression prevention programs among adolescents are more effective in reducing depressive symptoms than usual care, waiting lists, or monitoring conditions with the largest effect sizes for selective and indicated prevention (Hetrick et al., 2016; Horowitz & Garber, 2006; Stice et al., 2009; Werner-Seidler et al., 2017). Although the effects are small to moderate and outcomes are heterogeneous, it seems important to continue with implementing and evaluating selective- and indicated prevention programs for depression (Werner-Seidler et al., 2017).

Studies so far have provided useful information about the effectiveness of specific elements that are covered in depression prevention programs. For example, we know that programs based on Cognitive Behavioral Therapy (CBT) and Interpersonal Treatment (IPT) have the largest effect sizes. Also, the duration of prevention programs can affect the magnitude of treatment effects, with shorter programs being more effective in reducing depressive symptoms (Hetrick et al., 2016; Merry, Hetrick, et al., 2012; Rasing, Creemers, Janssens, & Scholte, 2017; Stice et al., 2009). Moreover, factors concerning the delivery of prevention programs can improve the effects. For example, effect sizes for school-based programs are larger when delivered by a psychologist than school

staff (Calear & Christensen, 2010; Stallard et al., 2014; Stice et al., 2009). Despite this knowledge, there is limited evidence for the effectiveness of indicated depression prevention programs that are actually implemented in schools (Brunwasser & Garber, 2016; Werner-Seidler et al., 2017).

Implementation of prevention programs seems to suffer from the large gap that exists between research and practice. Schools, for example, are often utilized for the examination of prevention programs, as this provides an easy way to reach adolescents and relieves most practical barriers, such as location, costs, and time (Barrett & Pahl, 2006; Werner-Seidler et al., 2017). However, the implementation of prevention programs—in the context of research—is generally more ad hoc than the actual implementation of evidence-based programs in schools with the purpose of preventing symptoms of psychopathology. The process of transferring evidence into practice asks for an adequate infrastructure and engaging schools and individuals in the process of implementation takes a lot of effort (Damschroder et al., 2009). Additionally, there are factors that may complicate implementation, such as poor financing, a lack of public awareness, and a non-supportive political atmosphere (Mallonee et al., 2006). Therefore, rather than focusing on if, we should focus on how we can provide prevention programs in a sustainable manner.

To meet this ambition, we examined the effectiveness of depression prevention for high-risk adolescents when fully implemented in school communities. Prior to the study, an intensive collaboration was started between all the schools in a rural area in the south of the Netherlands, public health services, the caregivers within the schools, and mental healthcare services that were connected to the schools. We named this collaboration on depression prevention the STORM-project, which stands for Strong Teens and Resilient Minds. The following preventive interventions were included: 1) early screening on depressive symptoms and suicidal ideation; 2) detected suicidality, followed by clinical referral; and 3) an indicated prevention program of eight sessions based on CBT for adolescents with elevated depressive symptoms. All participating organizations had a part in the prevention process, with the public health service responsible for screening and referral; with the school's licensed psychologists, together with caregivers from mental healthcare organizations, delivering the prevention program; and with the specialized mental healthcare institutes providing care for adolescents with high suicidal risk and supporting the process by sharing expertise and providing training.

Besides the benefits of collaboration on the communicating level, the continuity of care, and the expected reduction in overall mental healthcare costs, collaboration in the process of screening, identification, and prevention allows to identify and reduce depressive symptoms before they become severe. According to the clinical guidelines

for the treatment of depression, collaboration is essential to ensure timely and effective access to help, and prevention programs should also benefit from collaboration (NICE, 2019, Trimbos-Institute, 2009, US Preventive Services Task Force, 2009). Several recent meta-analyses made clear that collaborative care leads to better patient outcomes, reductions in health costs, and better patient and provider satisfaction (Archer et al., 2012; Coventry et al., 2014). Although a number of studies proved the effect or effectiveness of CBT depression prevention programs by involving school staff or community providers into the delivery of the program (Arnarson & Craighead, 2011; Gillham et al., 2012; Stice et al., 2009), this is one of the first study that proved the effectiveness of indicated depression prevention with the process of screening and prevention implemented in the school community—based on a strong collaboration with schools and caregivers (Brunwasser & Garber, 2016; Hetrick et al., 2016; Rasing et al., 2017; Werner-Seidler et al., 2017) .

Present study

The purpose of the current study was to evaluate the effectiveness of a CBT depression prevention program—Op Volle Kracht 2.0 (OVK 2.0, which translates to At Full Force)— as implemented in school communities in the prevention of depression for adolescents with elevated depressive symptoms. A Randomized Controlled Trial (RCT) was conducted, in which we screened adolescents on the presence of depressive symptoms and allocated participated adolescents with elevated depressive symptoms to the intervention and an active control condition, in which participants received psycho-education. The implementation of an infrastructure based on collaboration within school communities allowed us to evaluate OVK 2.0 under real world circumstances.

From a baseline to 12-month follow-up, as reported by adolescents and parents, we hypothesized that OVK 2.0 would lead to greater reduction in depressive symptoms, compared to psycho-education. Furthermore, we expected that adolescents who received OVK 2.0 would have a lower chance of depression onset after the intervention.

Method

The medical ethics committee CMO Region Arnhem-Nijmegen of the Netherlands, approved this study (NL55328.091.15). The study is registered in the Dutch Trial Register for RCT's (NTR5725). The study design will be reported in accordance with the CONSORT 2010 statement for reporting parallel group randomized trials (Schulz, Altman, & Moher, 2010).

Procedure

A total of 5,222 adolescents in the second year of 13 secondary schools, from vocational training up to pre-university level, were screened on depressive symptoms during two consecutive schoolyears (October – March 2016/2017 and October – March 2017/2018) with the Children's Depression Inventory 2 (CDI-2; Bodden et al., 2016; Kovacs, 2011). The screening was performed by the public health service (in Dutch: GGD) and was part of a larger routine health survey.

Inclusion criteria were elevated depressive symptoms according to the screening score ≥ 14 CDI-2; Bodden et al., 2016), ages between 11 and 15 years old, and sufficient knowledge of the Dutch language to participate. Exclusion criteria were the absence of parental permission, already undergoing CBT for mood problems, or the presence of high suicidality. Sixteen adolescents (0.3%) presented high suicidal ideation, and they were referred to mental healthcare organizations. All 457 (8.7%) adolescents who scored above the cut-off of 14, along with their parents, received information regarding the study. Next, adolescents and parents were contacted by the research team. After receiving informed assent from adolescents and parents, participants were randomly allocated to the experimental or control condition, stratified on school level. The randomization was carried out within schools by an independent researcher using a computer-generated randomization procedure. Adolescents and parents completed online surveys at the baseline (T1), after the intervention (T2), at 6-month follow-up (T3), and at the 12-month follow-up (T4). In addition, adolescents received a semi-structured clinical interview at the baseline and 6-month follow-up to determine the presence of clinical depression. Participants were informed of group allocation before the baseline measurement (T1). Adolescents received gift vouchers as a reward for filling in the questionnaires. More information about the procedure and participant flow is provided in Figure 1.

When participants during the study appeared to be at high risk for suicidality (as appeared from the questionnaires) or at risk for a severe clinical depression (as measured by the interview at the 6-month follow-up), they were seen by a professional of the public health service, parents were informed, and eventual, information about referrals were provided.

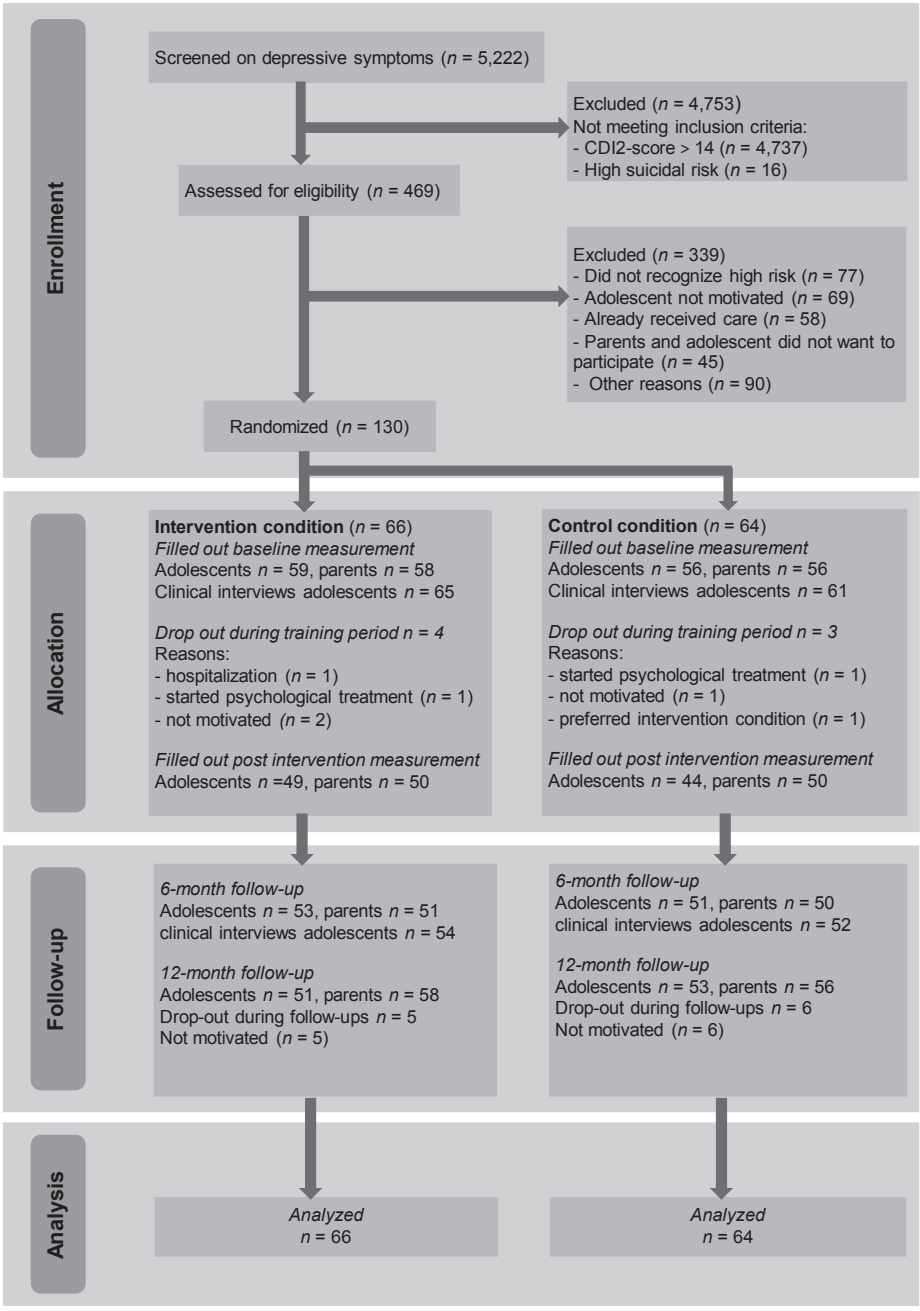

Figure 1. Flow diagram of participants.

Sample size and power

The intended main analysis strategy, as described in the study protocol (de Jonge-Heesen et al., 2016) was a repeated measures ANOVA. To find a significant difference in depressive symptoms between conditions, a sample size of 78 was needed (type I error probability of 0.05, power = 0.80 and medium effect size of f = 0.25). Including the effect of clustering data (group effect because the intervention was given in small groups), and an ICC of 0.07 in a comparative study (Wijnhoven et al., 2014), the Variance Inflation Factor became 1.49. The sample size had to be raised to 117 participants. Including the possible drop out of participants, the intended sample size was 160. The choice for an effect size of f = 0.25 was based on comparable studies (Werner-Seidler et al., 2017; Wijnhoven et al., 2014). Regarding the analysis method, Latent Growth Curve Modeling (LGCM; Muthén & Muthén, 1998-2015) was planned as additional strategy but was chosen as main strategy above repeated measures ANOVA, as this is a more flexible approach and directed to individual change over time. Given that repeated measures ANOVA is comparable with LGCM, we assumed that the power of the two techniques is about the same.

Participants

Out of the 5,222 adolescents, 469 (62.7% girls) had elevated depressive symptoms and were approached for participation in the study. Finally, 130 adolescents (63.8% girls) with elevated depressive symptoms participated. The participants were aged between 11 and 15 years (M = 13.59; SD = 0.68). Educational levels were as follows: vocational training (45.4%), vocational or high school training (5.4%), high school training (17.7%), high school or pre-university training (2.3%), and pre-university training (19.2%). Most participants were of Dutch origin (85.4%). Of the participants, 59.2% lived with their biological parents, and the other participants had divorced parents or a different family situation and lived, for example, with their foster parents.

Interventions

OVK 2.0

The Penn Resiliency Program (PRP; Brunwasser et al., 2009), which proved to be effective as a school-based universal prevention in the United States (US), was adapted to the Dutch culture and called OVK (Tak et al., 2012). The goal of this CBT-based prevention program is to teach adolescents to identify thoughts and emotions, as well as how activating events, thoughts, emotions and behaviors are related. In contrast to PRP, the OVK program did not prevent or decrease depressive symptoms on an universal and selected level (Kindt et al., 2014; Tak et al., 2016), but it did prove to be effective among adolescent girls when used as indicated prevention in a shortened protocol (8 lessons instead of the original 16; Wijnhoven et al., 2014).

OVK 2.0 is a modified and more up-to-date version of the original OVK program. Equal to the study of Wijnhoven et al. (2014), it consists of eight weekly, one-hour lessons in groups of three to eight adolescents. These eight lessons are based on CBT techniques. Homework in OVK 2.0 includes mood monitoring and energizing assignments that are based on positive psychology. Moreover, multi-media sources were included. Before the start of the program, there was an individual intake with the adolescent and the trainers, and an information meeting for the adolescents and their parents. Three months after the program, trainers organized a booster session for the adolescents and their parents. More details about the content of the program are described in a protocol paper (de Jonge-Heesen et al., 2016).

The program was delivered by school psychologists who were also staff members at school, together with a co-trainer of the collaborated mental healthcare organizations. They all received a three-day training program, covering training in CBT skills, theoretical principles, and the use of the prevention protocol. We measured treatment fidelity through a self-report questionnaire, assessing which exercises were actually given, and that trainers had to fill in after each lesson. The treatment fidelity was 84.7% (range from 74.6% to 94.7%).

Psycho-education

The participants in the psycho-education condition received a brochure with information about depressive symptoms. Also, participants received two e-mails with useful tips to boost their mood and decrease depressive symptoms. For example, they were encouraged to do more physical exercises and to find a sport they might like.

Measures

Depressive symptoms were measured with the CDI-2 (Bodden, Stikkelbroek et al., 2016; Kovacs, 2011). The CDI-2 is a self-report questionnaire comprising 28 items, each consisting of three statements rated in severity from 0 to 2 (e.g., "I don't feel alone" = 0, "I often feel alone" = 1, "I always feel alone" = 2). The CDI-2 was used for screening purposes, in accordance with the Dutch clinical guidelines for depression among youth (Trimbos-Institute, 2009). In this study, Cronbach's alpha ranged between 0.78 and 0.89.

Depressive symptoms according to parents was measured with the Dutch translation of the parent version of the CDI-2 (Bodden, Stikkelbroek, et al., 2016; Kovacs, 2011). This questionnaire comprised 17 items that are measured on a 4-point scale from 0 (not at all) to 3 (almost always), and parents had to rate the extent to which the items were in accordance with their child's thoughts, feelings, and behaviors (e.g., "My child seems lonely"). The psychometric qualities of the parent version of the CDI-2 were good (Kovacs, 2014). In this study, Cronbach's alpha ranged between 0.78 and 0.85.

The presence of a clinical depression was measured by the Dutch version of the Anxiety Disorder Interview Schedule for Children (ADIS-C; Siebelink et al., 2001; Silverman & Albano, 1996) during a clinical interview. This is a semi-structured diagnostic interview of the symptomatology, course, and severity of anxiety, mood disorders, and externalizing disorders in 7 to 17-year-old children, according to the DSM IV diagnostic criteria. In the study, we included a separate section relating to mood disorders, which includes the diagnostic criteria for dysthymic disorder and major depressive disorder. The interview took about 10 to 20 minutes, and it was administered by a qualified psychologist or by a trained master student under the supervision of a qualified psychologist. Participants had to respond "yes", "no", or "different" to standardized questions. The purpose of this interview was to investigate whether children met the criteria for a dysthymic disorder or major depression disorder. Interrater reliability and test-retest reliability of the ADIS-C were found to be good (Silverman, Saavedra, & Pina, 2001).

Suicidality (i.e., the presence of suicidal ideation) was measured with item 8 of CDI-2 on a three point scale (0 = "I don't think about ending my life, " 1 = "I think about ending my life, but I would never do it, " and 2 = "I want to end my life"). When adolescents reported a score of 2 on this item, during the screening or follow-ups, they were approached for an assessment by professionals of the public health service. These professionals were trained in the assessment of suicide risk by the project staff. In this assessment, the presence and severity of suicidality was checked, parents were informed, and clinical referrals were provided when necessary. During the screening, 54 adolescents scored 2 on the CDI-2 and were subsequently interviewed. Of these adolescents, 31 (57.4%) made a mistake, were joking, or misinterpreted this item; 7 (13.0%) adolescents were at low risk for suicidality and were approached for participation; 3 (5.5%) adolescents were at high risk for suicidality and needed to be referred to mental healthcare; 10 (18.5%) adolescents were at high risk for suicidality and received already mental healthcare and, in some cases, upscaling of care was necessary and this was discussed with the involved care provider; and 3 (5.5%) adolescents were at such high risk for suicidality that immediate help was necessary. When adolescents reported suicidality on follow-up measurements, they were contacted by the research team and invited for an assessment by the public health service. These participants were not excluded from the study.

Demographical variables were gender, educational level (i.e., vocational training or higher education), ethnicity (i.e., whether born in the Netherlands), and family situation (i.e., living with biological parents or different living situation).

Strategy of Analyses

Attrition

We conducted logistic regression analyses to analyze attrition at screening (T0; n = 465) trough baseline (T1; n = 130). Enrollment was used as the dependent variable, and depressive symptoms levels at screening and gender were used as predictors. The results indicated no differences for gender (*OR* = 0.88; p = 0.546) or depressive symptoms level (*OR* = 0.98; p = 0.455). Attrition was also analyzed for adolescents who were labeled as drop-outs because they did not fill in the questionnaires at T2, T3, and T4 or withdrew early in the study. No significant effects were found for the following: condition (*OR* = 0.67; p = 0.671), gender (*OR* = 0.43; p = 0.378), school level (*OR* = 4.50; p = 0.193), and ethnicity (*OR* = 1.68; p = 0.682).

During the study, we became aware of suicide attempts by two participants. One was reported by the mother in the parent questionnaire, and the other was informed by one of the collaboration partners. Both were girls, one in the experimental condition and one in the control condition. We reported these suicide attempts as serious adverse events.

Analyses

First, descriptive statistics and z-tests were used to describe and to analyze differences in depressive symptoms at all time-points for adolescents and their parents, with help of the statistical package, Mplus (Muthen & Muthen, 1998-2012).

The data were analyzed according to the intent-to-treat principle. To examine change in depressive symptoms over time, we used LGCM with Mplus (Muthén & Muthén, 1998-2015). Missing data were handled by using the Full Information Maximum Likelihood estimator (Enders, 2010; Johnson & Young, 2011). Participants with missing data on all four timepoints were automatically excluded from the analyses (5 adolescents, 11 parents). A prerequisite to use this estimator is that missing values of depressive symptoms are missing at random. Little's MCAR test showed that completely missing at random and, therefore, also missing at random is supported (χ^2 (41) = 47.46; p = 0.226).

To control for possible non-independence of the data because of nesting participants within schools, the procedure COMPLEX with the robust maximum likelihood estimator (MLR) was used. With this procedure, we got unbiased standard errors of the parameter estimates. Model fit indices were Chi-square (*df*), the Root Mean Square of Approximation (RMSEA; values < 0.08 means acceptable fit; Byrne, 1998) and the Comparative Fit Index (CFI; values > 0.90 means acceptable fit; Marsh, Hau, & Wen, 2004). Although these global fit indices are less suited for small sample sizes (N < 200; Chen et al., 2008; Taasoobshirazi & Wang, 2016), Coffman and Millsap found that despite a poor global fit (2006), a linear

growth model may provide a good approximation of the actual growth curve. Therefore, in the first step, we examined the adequacy of a linear model in comparison to a quadratic model for adolescent ratings of depressive symptoms. A linear model for both groups showed a fit of χ^2 (10) = 24.13, p = 0.007, RMSEA = 0.151, CFI = 0.907. The fit was acceptable according to the CFI-value and less acceptable according to the RMSEA value. A quadratic model for both groups showed a fit of χ^2 (2) = 0.46, p = 0.793, RMSEA = 0.000, CFI = 1.000. The fit of this model was excellent, but the question arose whether for this small sample of N = 130, a quadratic model was overfitting the data (Babyak, 2004). Therefore, we examined how well the estimated depressive symptoms scores at T1, T2, T3, and T4 (according to a linear or a quadratic regression model), correlated with the original scores on depressive symptoms. For the linear model, the correlations were 0.86, 0.86, 0.85, and 0.97, and for the quadratic model the correlations were 0.98, 0.78, 0.98, and -0.01. At T4, the correlation between the original scores and the estimated scores was zero, and this was an indication that a quadratic model is overfitting the data. For this reason, a linear model was chosen for adolescent-rated depressive symptoms as most adequate for our purposes, with intercept (*i*; initial estimated level of depressive symptoms) and slope (*s*; estimated degree of change of depressive symptoms over time) as latent growth parameters.

For parent-rated depressive symptoms the fit of the linear model was χ^2 (10) = 24.60, p = 0.006, RMSEA = 0.157, CFI = 0.913. The fit was acceptable according to the CFI-value and less acceptable according to the RMSEA value. The fit for the quadratic model was χ^2 (10) = 0.42, p = 0.810, RMSEA = 0.000, CFI = 1.000. Despite this excellent fit, we found that for the linear model the correlations between original scores and estimated scores were 0.90, 0.96, 0.86, and 0.97, and for the quadratic model the correlations were 0.98, 0.86, 0.98, -0.09, indicating that a quadratic model was overfitting the data. This supported the choice for a linear growth model. To test differences in *i* and *s* between experimental and control condition, we used the χ^2-difference test and compared the χ^2-value of the unconstrained growth model with the χ^2-value of the growth model, where the *i* was constrained to be equal in both conditions. A significant increase of the χ^2-value from baseline to *i*-constrained model indicates a significant difference of the mean intercept. In the same way, the χ^2-value of the *i*-constrained model was compared with the χ^2-value of the model, where both *i* and *s* were constrained to be equal. A significant difference in χ^2-value between both models indicates a significant difference in mean slope. As a result of using the MLR estimator, the χ^2-values of the models were divided by a scaling correction to get a better approximate of the χ^2-values. However, the difference between these two corrected χ^2-values is not χ^2-distributed. Therefore, the χ^2-values of the models were first rescaled to uncorrected χ^2-values before calculating the difference between the two χ^2-values (Satorra, 2000). Effect sizes for treatment efficacy were calculated by

the difference between the estimated means of the intervention and control condition at the end of the study (determined from the coefficient for the slope differences and length of study) divided by the baseline pooled standard deviation (Feingold, 2009).

Additional analyses

We have performed additional analyses to examine individual change over time of depressive symptoms. We calculated the Reliable Change Index (RCI) for each participant by dividing the pretest (T1) to follow-up (T4) score difference by the standard error of this difference. Adolescents with RCI-scores above 1.96 were classified as significantly improved, adolescents with RCI-scores between -1.96 and 1.96 were classified as unchanged, and adolescents with RCI-scores below -1.96 were classified as significantly worsened (Jacobson & Truax, 1992). We used the Fisher's exact test, followed by post hoc tests including Bonferroni correction (to correct for capitalization on chance), to test whether and how the classification of the intervention group differed from those of the control group. Furthermore, remission status of the participants that meet the criteria of a depressive disorder at baseline were calculated at the 6-month follow-ups, and the binary logistic regression analyses (with remission status as dependent variable and condition as predictor) were used to compare remission status between the experimental and control condition.

Results

Descriptives

In total, 5,222 adolescents were screened on depressive symptoms. Of the 469 adolescents that emerged from the screening, 130 participated in the study and were included in the analyses. Participation rates were good (T1 = 88.5%; T2 = 71.5%; T3 = 80.0%; T4 = 80.0%), with a lower percentage at T2, probably due to the start of the summer holiday. Table 1 shows descriptive statistics and test results of a comparison between experimental and control condition for depressive symptoms (adolescent and parent rated) at all time points. No significant differences were found in adolescent-rated depressive symptoms between both conditions at T0, T1, T2, and T3. At T4, adolescents in the experimental condition reported significantly fewer depressive symptoms than adolescents in the control condition. Parent-rated depressive symptoms differed significantly between both conditions at all time points, with higher means in the experimental condition.

Table 1

Means, Standard Deviations, and Z-values for Differences on Adolescent-rated (CDI-2:C) and Parent-rated Depressive Symptoms (CDI-2:P) between the Intervention and Control Condition

	Intervention condition (*N* = 66)		Control condition (*N* = 64)			
Adolescent-rated	*M*	*SD*	*M*	*SD*	*z*-value	*P*
CDI-2:C T0	18.66	4.21	18.42	4.54	.41	.679
CDI-2:C T1	16.18	4.92	15.68	7.08	.45	.655
CDI-2:C T2	13.32	7.07	14.71	9.06	-.80	.423
CDI-2:C T3	12.10	6.85	13.72	8.72	-.98	.326
CDI-2:C T4	10.78	7.05	13.32	7.50	-1.98	.048
Parent-rated	(*N* = 60)		(*N* = 59)			
CDI-2:P T1	20.14	5.54	16.78	5.86	2.57	.010
CDI-2:P T2	18.66	6.00	15.09	6.36	2.96	.003
CDI-2:P T3	17.42	6.27	14.41	6.21	2.94	.003
CDI-2:P T4	16.59	6.34	14.07	6.53	2.10	.035

Latent Growth Curve Modelling

In the analysis section it is concluded that a linear growth model for depressive symptoms is most appropriate for adolescent and parent ratings. Therefore, we examined both linear growth models in which time was coded in months (0, 3, 6, and 12 months). For adolescent ratings, the estimated growth parameters in this model were: i = 15.54 and s = -0.40 (p

= <0.001) in the intervention condition, and i = 14.95 and s = -0.16 (p = <0.001) in the control condition. Figure 2 shows this model. The second step was to test our hypothesis: that the intervention condition would show a greater decrease in depressive symptoms than the control condition. First, we tested whether the intercept was different between both conditions. The χ^2-difference test was not significant, with $\Delta\chi^2(1) = 0.07$ and $p = 0.791$, indicating that the mean starting level of depressive symptoms was not significantly different between both conditions. Next, we tested whether the slope was different between both conditions. The χ^2-difference test showed a significant effect, with $\Delta\chi^2(1) = 4.35$ and $p = 0.037$, indicating that the decrease in depressive symptoms was larger in the intervention condition compared to the control condition. The effect is 0.47, indicating an almost medium effect size.

For parent ratings, the parameters were i = 19.72 and s = -0.28 (p = <0.001) in the intervention condition, and i = 16.14 and s = -0.19 (p = 0.018) in the control condition. Figure 3 shows this model. The intercept appeared to be significant between both conditions, and the χ^2-difference test showed a significant effect for the intercept with $\Delta\chi^2(1) = 10.76$ and p = 0.001. The mean starting level of depressive symptoms in the intervention condition is significantly higher than in the control condition. There was no significant difference in decrease of parent-rated depressive symptoms between both conditions ($\Delta\chi^2(1) = 1.75$; p = 0.186). The effect size is 0.19, indicating a very small effect size.

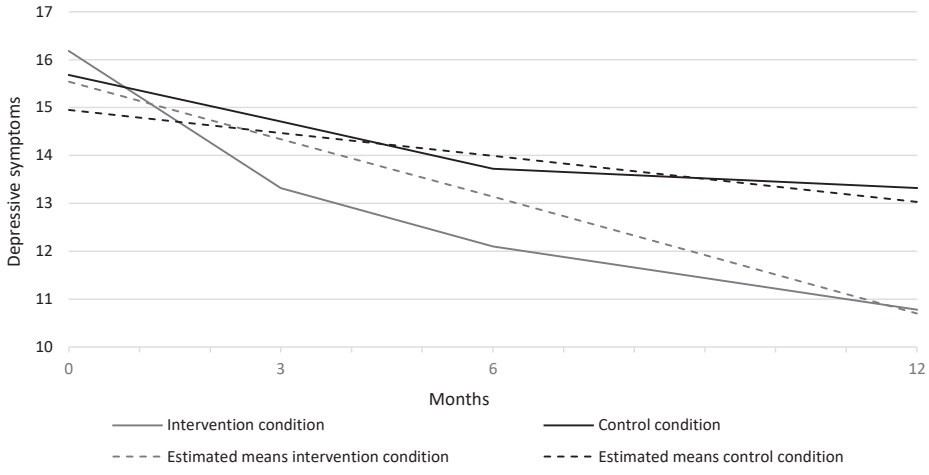

Figure 2. Mean scores of adolescent-reported depressive symptoms over time in the experimental and control condition.

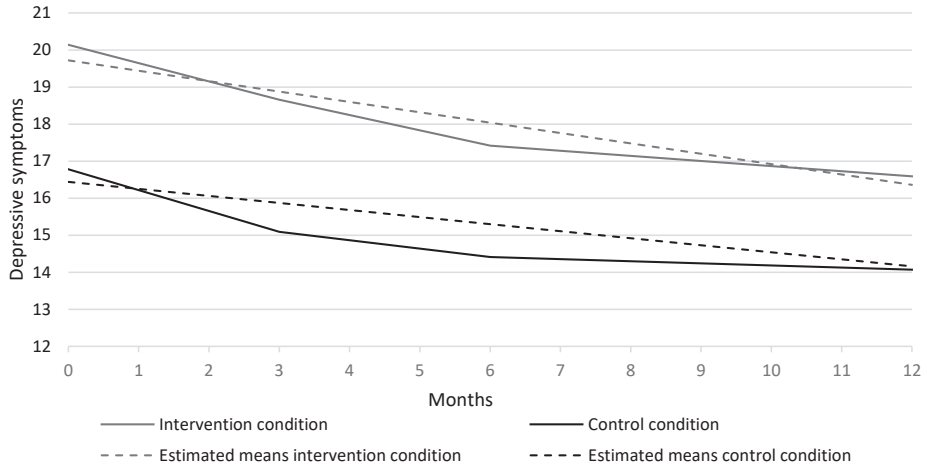

Figure 3. Mean scores of parent-rated depressive symptoms over time in the experimental and control condition.

Individual change over time

Between the baseline and 12-month follow-up, 38.3% of the adolescents in the intervention condition improved, compared to 12.5% in the control condition. The percentage of adolescents that worsened was 2.1% in the experimental condition, compared to 8.3% in the control condition. The percentage of adolescents that remained unchanged was 59.6% in the intervention condition and 79.2% in the control condition. Fisher's exact test showed a *p*-value of 0.007, indicating that the control condition differed from the intervention condition. Post hoc test including Bonferroni correction, showed that in the intervention condition, the percentage of participants that did not change was significantly lower, and the percentage of participants that improved was significantly higher than in the control condition.

Remission status

Furthermore, we calculated the remission status of participants that met the criteria of a depressive disorder in both conditions. Only participants for whom pretest and the 6-month follow-up measure of the ADIS-C were available, and were included in the analysis. A total of 105 participants met this criterium. At pre-test, 7 participants (10.8%) in the intervention condition and 12 participants (19.7%) in the control condition fulfilled the diagnosis of a depressive disorder. At the 6-month follow-up, 3 participants (5.5%) in the intervention condition and 4 (7.7%) in the control condition fulfilled the diagnosis of a depressive disorder. Binary logistic regression analyses revealed that remission status do not differ between conditions (*OR* = 0.83, *p* = 0.906).

Discussion

The aim of the present study was to test the effectiveness of OVK 2.0 in the prevention of depression for adolescents with elevated depressive symptoms when implemented in school communities. Findings from LGCM show that the decrease in self-reported depressive symptoms was significant in both conditions, from the baseline to 12-months after the interventions, and that the decrease in depressive symptoms was significantly larger in the experimental condition with 42.6% of the adolescents who improved, than in the control condition with 16.2% of the adolescents who improved. This indicates that a CBT prevention program is effective in reducing elevated depressive symptoms in adolescents when implemented in school communities.

Based on the findings, we recommend the implementation of screening and prevention in schools according the basics of this study design, which is: screening on depressive symptoms and suicidal ideation and providing indicated prevention. Although psycho-education could be a low-cost and easier way for offering prevention, the findings indicate that CBT-based prevention might ensure more sustainable outcomes. Although this study did not examine the advantages or benefits from the integrated care approach that formed the base of this study, we experienced that there are a number of foreseen as well unforeseen profits. In addition to the improved collaboration between schools and care providers, we were able to identify and refer adolescents high at risk for suicidality. Important as well, we experienced that, in both conditions, the confidence of schools and care professionals regarding this topic increased over the course of the study, and that adolescents felt more comfortable to display their worries or feelings within the school setting. Moreover, schools became activated in their role in prevention. Where in the first year of this project schools and care givers were hesitant, in the second year they took initiative by planning for the next years and suggesting improvements. Also, schools initiated collaboration on other mental healthcare themes, such as self-harm. This way, such collaboration might form a stable infrastructure in which new developments can be adapted to improve prevention.

The positive findings regarding the effects of OVK 2.0 is promising in many ways. First, the findings are in line with Wijnhoven et al. (2016), who found similar effects for OVK 2.0 in a sample of high-risk adolescent girls. This is important because we are often unaware of the relative effectiveness or circumstances that modify the effectiveness; therefore, it is likely that effects might not sustain when transferring into practice. This study showed that OVK 2.0, when part of implemented depression prevention, was also effective in reducing depressive symptoms in a mixed sample with boys and girls, and when provided by different trainers. Second, although meta-analyses show that indicated prevention seem to

be effective in the short term only (Hetrick et al., 2016; Rasing et al., 2017), this study showed that the effect remained at the 12-month follow-up. Lastly, to our knowledge, this is the first study that examined indicated depression prevention in adolescents when implemented in the school community; therefore, the findings give hope for future implementation.

Despite, the significant decrease of self-reported depressive symptoms in the OVK 2.0 condition, there was no significant difference in the decrease of parent-rated depressive symptoms. Also, there was no significant difference between conditions in future incidence of depressive episodes. Although the study is underpowered to detect differences in depression onset, it is encouraging that, given the sharp increase in depression rates during adolescence, depressive symptoms actually decreased during the study.

Furthermore, a discrepancy between parents and adolescents in the report of depressive symptoms is frequently observed, with parents over-reporting in a general population and underreporting in a clinical population (Bodden et al., 2016; De Los Reyes, Cook, Gresham, Makol, & Wang, 2019). Parents seem to be more aware of symptoms when they become severe, possibly because symptoms then become visible. This could also explain the higher starting level of parent-reported depressive symptoms in the intervention condition, as compared to the control condition. By allocation to the intervention condition, parents might be more aware of symptoms and a possible change due to the active character of the intervention than in the relatively passive control condition. Also, nonresponses and the different reasons for this nonresponse might have caused the observed difference. For example, high parent-rated scores might been missing due to disappointment of parents that their child did not made it to the intervention condition. Nevertheless, future research should continue to include both informants as a study of Cohen, So, Young, Hankin, and Lee (2019) showed that adolescent-reported symptoms are the best predictor for concurrent depressive episodes; however, to predict future episodes, both adolescent and parent reports were necessary. Parents seem to be better in identifying behavioral signs that are important precursors of a depression.

Strengths and limitations

This study has some important strengths. First, we implemented the evaluated preventive interventions in school communities, which allowed us to examine the effects of OVK 2.0 under real-life circumstances. Second, we used adolescent-rated and parent-rated depressive symptoms. Moreover, we used a clinical interview to determine the effects of depression prevention on actual prevention of diagnoses of depression. Third, the study design allowed us to examine the effectiveness of OVK 2.0 beyond an active control condition. Finally, the follow-up measurements allowed us to examine the long-term effectiveness of the intervention.

Despite the robust RCT design, some limitations must be noted. Randomization was carried out at the school level, which limits the random allocation of participants. Also, in the control condition, we did not measure if adolescents actually read the psycho-education and whether they found this information helpful, which limits the fidelity of this intervention. Furthermore, only 27% of the adolescents that were approached to participate in this study agreed to participate. This raises questions about a bias in selection of the participants group. For example, we noticed that parents in this age group had an important voice in whether to participate. A relatively large group of adolescents were initially not very motivated for participation, and it was up to their parent(s) if participation was refused or reconsidered. When depressive symptoms were not recognized in everyday life, it was more likely that they refused to participate (see also Figure 1). Therefore, it might be that participated adolescents had more concerned parents or parents that endorsed the importance of prevention. This parent's concern might also be displayed by the higher parent-rated depressive symptoms, as compared to adolescent-rated symptoms. Although, the sample size was too small to rule out the effect of selectivity, future implementation studies should search for strategies to maximize enrollment.

Clinical implications

Integrating depression prevention in (school) communities is a new step forward that brings new questions and challenges. As discussed in the limitations, motivating adolescents and parents for participation is one of those challenges. In order to improve enrollment, it is crucial to examine how we can improve the acceptability of prevention programs which might lower the threshold to join these programs. We experienced that the most important reasons to decline participation were the lack of motivation and the lack of understanding of utility and necessity of adolescents or parents. It is important to examine the best approach to increase the motivation and the sense of urgency, for example, by decreasing the stigma of depression among adolescents. Universal mental health programs could create more awareness of mental health and promote help-seeking behavior in adolescents (Dray et al., 2017), especially when this is integrated into the school curriculum.

In addition to the adolescents, it also seems important to create awareness in the adolescent's environment; for example, by introducing parent information sessions in schools regarding this theme. Also, teachers and mentors, who are often in contact with both adolescents and parents, should be able to recognize depressive symptoms and support in the participation in prevention programs or the process of help-seeking. The Gatekeepers training, for example, can be used for this purpose. Although the main goal of this training is to learn how to respond to suicidality, it proved to be helpful in referring adolescents to appropriate mental health services, especially when given in school-based

settings (Condron et al., 2015; Rodi et al., 2012). Moreover, the training improves knowledge of suicidality and confidence to conduct a dialogue on suicidal thoughts (Terpstra et al., 2018). Given the strong association between the presence of suicidality and depressive symptoms, as well as the screening on suicidality as a prevention strategy, the gatekeepers training might be a sufficient tool to engage teachers and mentors in depression and suicide prevention.

Future research

This study showed an overall decrease in depressive symptoms for adolescents receiving the intervention. However, we have also shown that not all individuals benefited from the prevention program. The next step in research should be to gain more insight in for whom this strategy is effective, often mentioned as precision prevention. Earlier research, specifically longitudinal studies, identified four classes of adolescents, with each class characterized by a pattern of change of depressive symptoms: 1) low stable or no symptoms, 2) intermediate symptoms that decrease over time, 3) intermediate symptoms that increase over time, and 4) chronic or persistent high level of symptoms (Ames & Leadbeater, 2018; Schubert, Clark, Van, Collinson, & Baune, 2017). The knowledge of these development patterns of depressive symptoms, should be used to explore the effect of the intervention, and to study if we could predict whether individuals respond to prevention programs. Another suggestion is to study whether certain risk factors or risk patterns predict the responsiveness of individuals to a prevention program. We expect that the chronic or persistent group include adolescents at risk who are almost resistant for prevention programs due to a combination of risk factors (e.g., parental psychopathology, obesity, or traumatic childhood experiences). Future research should focus on the identification of these risk patterns, as this can be used to advance the screening and prevention process; for example, by combining parent and adolescent depression treatment or timely upscaling of mental healthcare. These suggestions should result in more insights into for whom the intervention will be effective or not and is necessary to take precision prevention to the next level.

Conclusions

In conclusion, this study showed that a CBT program, as indicated depression prevention, is effective in reducing depressive symptoms when implemented in school communities. Given the high rates of adolescents that suffer from depressive feelings worldwide, implementation of indicated prevention programs, screenings, and subsequent referrals of suicidality are priorities. Schools, care givers, politicians, communities, and researchers should co-operate in the sustainable implementation of depression prevention. Bridging the gap between science and practice is challenging; however with the opportunity to improve prevention work, the challenge is worth pursuing.

Chapter 6

Secondary outcomes of implemented depression prevention in adolescents: A randomized controlled trial

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Abstract

Our most recent RCT provides evidence that indicated depression prevention is effective in reducing depressive symptoms in adolescents when implemented in the school community. In the present study we further test the potential effects of this prevention approach on symptoms related to depression: anxiety, suicidality, somatic symptoms, and perfectionism. We conducted exploratory analyses in 130 adolescents with elevated depressive symptoms aged between 12 and 16 years old (M = 13.59; SD = 0.68; 63.8% girls) who were randomly assigned to the experimental (OVK 2.0) or active control condition (psycho-education). Self-reported anxiety, suicidality, somatic symptoms, and perfectionism were assessed at pretest, post intervention, as well as 6- and 12-months follow-up. Latent growth curve analyses revealed that there was a significant decrease in anxiety in both conditions and that this decrease was significantly larger in the intervention condition than in the control condition. Somatic symptoms and socially prescribed perfectionism decreased significantly in the intervention condition and suicidality decreased significantly in the control condition. Yet there was no difference in decrease in suicidality, somatic symptoms, and perfectionism between the two conditions. This study suggest that screening on depressive symptoms and providing a CBT depression prevention program for adolescents with elevated depressive symptoms, can decrease comorbid symptoms of anxiety and therefore ensure better outcomes. We discuss the clinical implications as well suggestions for future research.

Introduction

The number of adolescents experiencing depression is substantial, with approximately 15.5% of adolescents experiencing depression between the ages of 11 and 19 (Ormel et al., 2015). Moreover, these rates have increased in recent years, with a growing number of adolescents with untreated depression (Mojtabai & Olfson, 2014). The consequences of depression are tremendous, especially in adolescence. Important developmental processes take place in this phase of life, for instance the development of positive relationships and the maturation of skills that are important for life and work (Patton & Viner, 2007). It is therefore not surprising that the experience of depression in this developmental period is associated with several poor outcomes such as failure to complete secondary school, unemployment, and substance misuse (Clayborne et al., 2019; Fergusson & Woodward, 2002). Considering the negative outcomes, the prevention of depression should be a priority.

Several meta-analyses have shown that prevention programs could be effective in the prevention of depression, with the largest effect sizes for programs designed for adolescents who already have elevated depressive symptoms (Hetrick et al., 2016; Horowitz & Garber, 2006; Rasing et al., 2017; Stice et al., 2009; Werner-Seidler et al., 2017). Yet the implementation of these programs seems to suffer from practical barriers such as lack of communication between researchers and practitioners, poor financing, and interventions that are too complex, costly, or narrowly focused (Damschroder et al., 2009; Mallonee et al., 2006). Until recently, it has been unclear whether the prevention effects that were found would remain when preventive interventions are implemented on a large scale.

Our most recent randomized controlled trial (RCT) about an integrated depression prevention approach (STORM: Strong Teens and Resilient Minds) examined the effectiveness of indicated prevention in reducing depressive symptoms in adolescents. This approach has a strong focus on collaboration between schools and (mental) health care partners and includes: 1) early screening for depressive symptoms and suicidal ideation, followed by clinical referral for students with acute suicidality; and 2) an indicated depression prevention program for adolescents with elevated depressive symptoms. The integration of STORM in the school community made it possible to examine the effectiveness of depression prevention under real life circumstances. In the RCT, the Cognitive Behavioral Therapy (CBT) based program entitled 'Op Volle Kracht' 2.0 (OVK 2.0) was compared with psycho-education. The findings showed that OVK 2.0 was significantly more effective in reducing depressive symptoms than psycho-education one year after the prevention program, although it should be noted that depressive symptoms decreased in both conditions (de Jonge-Heesen et al., 2020; de Jonge-Heesen et al., 2016).

These important findings are the basis from which to further unravel the potential effects of this program on other internalizing problems. It is possible that prevention strategies aimed at depression also affect other internalizing symptoms, suggesting that more adolescents with mental health needs might benefit from this prevention approach. Accordingly, the purpose of this study is to conduct exploratory analyses of the effect of indicated depression prevention on symptoms related to depression, which are: anxiety, suicidality, perfectionism, and somatic symptoms.

Anxiety, suicidality, somatic symptoms, and perfectionism are all strongly related to depressive symptoms and co-occur in a high degree (Egger, Costello, Erkanli, & Angold, 1999; Kerkhof, 2002; Limburg et al., 2017; Melton et al., 2016; Smith et al., 2018). Moreover, they seem to share the same biomarkers, underlying mechanisms, and risk factors as depression, and might therefore respond similarly to a specific prevention approach (Caspi & Moffitt, 2018). Despite the high comorbidity, in clinical practice it is not uncommon that these concepts cover up symptoms of depression. For example, headache and abdominal pain, which are the most frequent complaints in adolescents, are often triggered by stress and, when not acknowledged, could ultimately lead to symptoms of internalizing problems (Campo, 2012; Torsheim & Wold, 2001). Also, adolescents high in perfectionism are often internally motivated to conceal internalizing symptoms, in fear of falling short of standards (Horesh, Zalsman, & Apter, 2004). This impedes the detection of underlying depressive symptoms, which is detrimental for several reasons, one of which is that untreated adolescent depression is related to a recurrence of symptoms in adulthood (Patton et al., 2014).

Although anxiety, suicidality, somatic symptoms, and perfectionism are related to depressive symptoms, it is unknown whether a prevention program aimed at depressive symptoms affects other symptoms too. Due to the high comorbidity and shared etiology, it could be expected that a decrease in depressive symptoms is associated with lower levels of other adverse outcomes. The outcomes of this study would add valuable information for further implementation as it is more efficient to implement interventions that also target coexisting problems. Although these analyses are largely exploratory, we hypothesized that prevention would lead to a reduction in symptoms. Specifically, we expect that adolescents who received OVK 2.0 would show larger reductions in anxiety, suicidality, somatic symptoms, and perfectionism than adolescents who received psycho-education.

Method

Participants

As is described elsewhere (de Jonge-Heesen et al., 2020), in this study a total of 5,222 adolescents in the second year of secondary schools were screened for depressive symptoms. Of the 5,222 adolescents, 469 had elevated depressive symptoms and these adolescents were approached for further study. Besides elevated depressive symptoms according to the screening (score ≥14; CDI-2; Bodden, Stikkelbroek, et al., 2016; Kovacs, 2011), inclusion criteria were: sufficient knowledge of the Dutch language, and age between 11 and 15 years old. Exclusion criteria were: presence of high suicidality, already undergoing CBT for mood problems, and absence of parental permission. Ultimately, 130 adolescents aged between 11 and 15 years old participated (M = 13.59; SD = 0.68; 63.8% girls). School levels varied between vocational training (45.4%) and pre-university training (19.2%). The majority of the participants were of Dutch origin (85.4%). After obtaining informed consent from adolescents and parents, participants were randomly allocated to OVK 2.0 (n = 66; the intervention condition) or psycho-education (n = 64; the control condition). Randomization was stratified on school level and was performed by an independent researcher. Participants completed online surveys at baseline (T1), after the intervention (T2), at 6-month follow-up (T3), and at 12-month follow-up (T4). After completion of each survey, participants received a gift voucher. More information about the participant flow is provided in Chapter 4, presenting a flow diagram of the study.

Interventions

OVK 2.0

OVK has its origin in the Penn Resiliency Program (PRP; Gillham, Reivich, Freres, Chaplin, Shatté, et al., 2007), which was developed in the United States and proved to be effective as universal prevention within a school setting (Brunwasser et al., 2009). In the Netherlands, OVK was investigated on several prevention levels, and it was concluding that the program was not effective in the prevention of depressive symptoms on a universal and selective level (Kindt et al., 2014; Tak et al., 2016). In a shortened protocol (8 lessons instead of 16), OVK was proved to be effective in adolescent girls with elevated depressive symptoms (Wijnhoven et al., 2014). Consequently OVK 2.0 is a modified version of the original OVK program based on the program that was used in the study of Wijnhoven et al. (2014). The goal of OVK 2.0 is to teach adolescents how to recognize their thoughts and emotions, and how these are related with each other and with their behavior. The training was given in eight one-hour lessons in groups of three to eight adolescents, and the techniques in the training were based on CBT. Trainers had to fill in a checklist of exercises after each lesson to measure the treatment fidelity. Adherence to the protocol ranged from 74.6% to 94.7%. The study protocol and article presenting the main effects present more details about the content of the program and the background of the trainers (de Jonge-Heesen et al., 2020; de Jonge-Heesen et al., 2016).

Psycho-education

Psycho-education consisted of a brochure with information about depressive symptoms and two e-mails with advice and tips on how to decrease depressive symptoms. For example, adolescents were encouraged to continue doing activities that used to give them a positive feeling.

Measures

Anxiety was measured with the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1970a). We used the 20 items measuring state anxiety. Participants had to rate on a 4-point scale that ranged from 0 (almost never) to 3 (almost always) how they feel at the moment (e.g., "I feel nervous"). Cronbach's alpha ranged from 0.91 to 0.93 over the various assessment points.

Suicidality was measured with the VOZZ-Screen (Kerkhof & Huisman, 2016). This 10-item questionnaire assesses thoughts and actions about suicide, suicidal ideations, self-harm, and life. Items about life (e.g., "I feel worthless") are rated on a 5-point scale ranging from 1 (I totally agree) to 5 (I totally disagree). Items about self-harm and suicide (e.g., "I attempted suicide") are rated on a 5-point scale from 1 (never) to 5 (very often). Items about suicidal ideation in the past week (e.g., "I thought that suicide would be a solution for my problems") are rated on a 5-point scale from 1 (never) to 5 (every day). Cronbach's alpha ranged between 0.79 and 0.81 over the various assessment points.

A sum score of 23 or above is an indication of a serious suicide risk. Adolescents who appeared to be at high risk for suicidality by a score of 23 or above or by filling in the item about suicide in the CDI-2 with "I want to end my life", were seen by a professional of the public health service within the school. Subsequently, parents were informed, and eventual information about referrals were provided.

Somatic symptoms were measured with the Dutch version of the Children's Somatization Inventory (CSI; Meesters, Muris, Ghys, Reumerman, & Rooijmans, 2003; Walker & Garber, 1992), consisting of 35 items on which participants had to rate on a 5-point scale from 0 (no suffering) to 4 (much suffering) to what extent they have been bothered by somatic symptoms in the past two weeks (e.g., "abdominal pain"). Cronbach's alpha was 0.92 at all timepoints.

Perfectionism was measured with the Dutch version of the Frost Multidimensional Perfectionism Scale (F-MPS; Boone et al., 2014; Frost et al., 1990). This questionnaire contains 35 items and six subscales of perfectionism: concern over mistakes, doubts, personal standards, organization, parental expectations, and parental criticism. Participants have to

rate to what extent each statement fits them on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). For the purpose of the present study, we only used the subscales concern over mistakes (e.g., "I hate being less than the best at things"), doubt about actions (e.g., "I usually have doubts about the simple everyday things I do"), and personal standards (e.g., "I set higher goals than most people").

In line with the literature on perfectionism (Smith et al., 2018), we distinguished two factors in perfectionism: personal standards perfectionism (PS; sum score of personal standards, 7 items) and concerns about mistakes and doubts perfectionism (CMD; sum scores of concerns about mistakes and doubt about actions, 13 items). PS represents self-orienting perfectionism (setting unreasonably high standards and goals) and CMD represents socially prescribed perfectionism (doubts and excessive concern for mistakes; Frost et al., 1990; Stoeber & Otto, 2006). Cronbach's alpha ranged between 0.86 and 0.88 for PS and between 0.91 and 0.94 for CMD over the various assessment points.

Strategy of Analyses

Data were analyzed with the statistical package Mplus version 7.2 (Muthén & Muthén, 1998-2015). First, we used descriptive statistics and z-tests to analyze differences in the measured concepts at all timepoints. Next, we used Latent Growth Curve Models (LGCM) to test the longitudinal effectiveness of OVK 2.0 on secondary outcomes, according to the intent-to-treat principle. The Full Information Maximum Likelihood estimator (FIML; Enders, 2010; Johnson & Young, 2011) was used to handle missing data under the condition that missings are at random. Little's MCAR test showed that completely missing at random was supported (χ^2 [362] = 394.81, p = 0.113). Five participants were excluded from the analyses because of missing data at all four timepoints, two from the intervention condition and three from the control condition.

The procedure COMPLEX with the robust maximum likelihood estimator (MLR) was used to control for non-independence of the data because of nesting participants within the 13 schools. We used the following fit indices: Chi-square (*df*), the Root Mean Square of Approximation (RMSEA; values < 0.08 means acceptable fit; Byrne, 1998), and the Comparative Fit Index (CFI; values > 0.90 means acceptable fit; Marsh et al., 2004).

In the study for main effects of the RCT (de Jonge-Heesen et al., 2020), a linear growth model for depressive symptoms was accepted above a quadratic one, because a quadratic model was overfitting the data (Babyak, 2004). This was also the case for the secondary outcomes, and a linear growth model for each of the secondary outcomes was accepted as most adequate. Parameters were intercept (*i*; initial estimated level) and slope (*s*; estimated degree of change over time) as latent growth parameters, and time was coded in

months (0, 3, 6, and 12 months). For anxiety, the linear model showed a fit of $\chi^2(12) = 33.35$, $p = 0.001$, RMSEA = 0.169, CFI = 0.904. For suicidality, the fit of the model was $\chi^2(12) = 12.11$, $p = 0.437$, RMSEA = 0.012, CFI = 0.999. For somatic symptoms, the fit of the model was $\chi^2(12) = 31.21$, $p = 0.002$, RMSEA = 0.161, CFI = 0.888. The model fit of PS perfectionism was $\chi^2(12) = 34.75$, $p = 0.001$, RMSEA = 0.175, CFI = 0.866. Finally, the model fit of CMD perfectionism was $\chi^2(12) = 11.28$, $p = 0.505$, RMSEA = 0.000, CFI = 1.000. The fit of three models was acceptable for the CFI with values > 0.90, but two models had a CFI-value somewhat below 0.90. Additionally, the fit for three models was less acceptable for the RMSEA (the models of anxiety, somatic symptoms, and PS perfectionism). However, for small samples cutoff values of 0.10 for RMSEA are too restrictive (Chen et al., 2008), and acceptable models might be over-rejected (Herzog & Boomsma, 2009). Moreover, poor global fit indices (CFI and RMSEA) can be misleading: they may still be consistent with a good approximation of individual growth curves (Coffman & Millsap, 2006). Therefore, these models were accepted.

Next, we used the χ^2 difference test to test differences in intercept between the intervention and control condition, by comparing the χ^2 value of the unconstrained model with the χ^2 value of the growth model where both intercepts were constrained to be equal. A significant difference in intercept was indicated when the χ^2 value significantly differed between the conditions. For testing differences in slope, the testing procedure was repeated by comparing the equal intercept constrained model with the equal intercept and equal slope model.

Results

As emerged from the screening, 469 adolescents reported elevated depressive symptoms. Of these adolescents, 130 participated in our study. The percentage of adolescents completing the surveys at baseline (T1), post-intervention (T2), 6-month (T3) follow-up, and 12-month (T4) follow-up were 88.5%, 71.5%, 80.0%, and 80.0%. The descriptive statistics and test results of the comparison between intervention and control condition for all secondary outcomes are presented in Table 1. No significant differences between the intervention and control condition in suicidality, somatic symptoms, and CMD were found. Anxiety differed with marginal significance between the conditions at T4, with higher means in the control condition. In addition, PS differed significantly between the conditions at T2 and at T4, with higher means in the control condition. Correlations between the outcome variables and depressive symptoms are presented in Table A in the Appendix.

Latent Growth Curve Modelling

First, we examined the linear growth models of anxiety, suicidality, somatic symptoms, PS perfectionism, and CMD perfectionism for the intervention and control conditions. The results of these analyses are presented in Table 2. Besides the intercepts and slopes, the fit measures of the baseline models are also described in this table. The results show that slopes are significant for anxiety, showing that anxiety decreased over time in both conditions. The significant negative slopes for somatic symptoms and CMD perfectionism in the intervention condition indicate a decrease over time as well. Furthermore, suicidality decreased significantly in the control condition and showed a decreasing trend in the intervention condition.

Second, we tested whether intercept and slopes differed between the intervention and control condition (last four columns in Table 2). For anxiety only, the Chi-square difference tests between groups showed that the slopes in the intervention and control group were significantly different (see Table 2). The decrease in anxiety in the intervention condition (s = -0.62) was stronger than in the control condition (s = -0.24). Figure 1 shows the course of anxiety in the intervention and control condition.

Table 1

Means, Standard Deviations, and Z-values for Differences on Anxiety, Suicidality, Somatic Symptoms, and Perfectionism (PS and CMD) between the Intervention and Control Condition

	Intervention condition (*N* = 64)		Control condition (*N* = 61)			
	M	*SD*	*M*	*SD*	*z*-value	*P*
Anxiety T1	42.73	10.21	42.51	11.18	.13	.896
Anxiety T2	38.72	11.15	39.38	11.35	-.27	.786
Anxiety T3	38.48	11.96	40.29	11.79	-1.17	.241
Anxiety T4	34.65	11.07	38.50	10.58	-1.92	.055
Suicidality T1	17.92	4.77	19.40	6.42	-1.23	.219
Suicidality T2	17.76	6.22	19.24	6.50	-1.62	.105
Suicidality T3	16.83	5.56	18.61	6.52	-1.70	.089
Suicidality T4	16.70	5.76	18.06	5.90	-1.75	.080
Somatic symptoms T1	20.01	13.76	22.24	18.63	-.60	.547
Somatic symptoms T2	19.22	16.49	18.17	17.03	.44	.660
Somatic symptoms T3	16.46	14.15	19.82	16.85	-1.21	.226
Somatic symptoms T4	16.87	15.78	18.51	16.95	-.37	.715
PS perfectionism T1	15.19	7.15	15.24	6.26	-.08	.935
PS perfectionism T2	13.18	5.41	15.30	6.90	2.71	.007
PS perfectionism T3	14.33	6.08	15.53	7.33	-1.58	.114
PS perfectionism T4	13.80	5.61	15.34	6.94	-2.38	.017
CMD perfectionism T1	26.97	10.91	27.88	10.92	-.36	.715
CMD perfectionism T2	24.14	10.46	25.38	11.48	-1.17	.243
CMD perfectionism T3	25.15	11.36	26.56	12.93	-.84	.400
CMD perfectionism T4	22.93	11.07	25.53	10.61	-1.65	.099

Table 2

Results of Latent Growth Curve Analyses for the Five Outcome Variables

	Intervention condition				Control condition			
	I	*p*	S	*p*	I	*p*	s	*P*
Anxiety	41.91	.000	-.62	.000	41.40	.000	-.24	.001
Suicidality	17.84	.000	-.10	.065	19.41	.000	-.11	.001
Somatic symptoms	19.29	.000	-.21	.036	20.62	.000	-.18	.070
PS perfectionism	13.69	.000	.02	.682	15.28	.000	.02	.778
CMD perfectionism	26.15	.000	-.27	.005	27.45	.000	-.16	.150

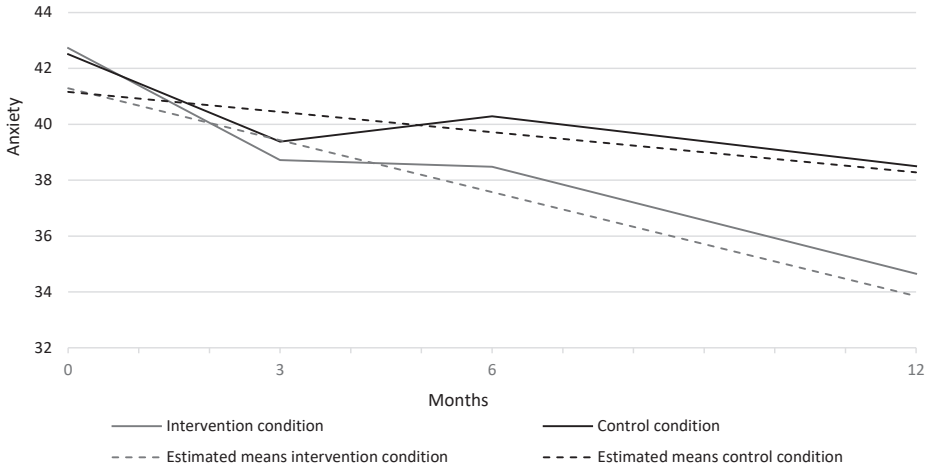

Figure 1. Mean scores of anxiety over time in the intervention and control condition.

Fit measures of baseline model				Test between conditions for intercepts		for slopes	
$\chi^2(12)$	*p*	CFI	RMSEA	$\Delta\chi^2(1)$	*p*	$\Delta\chi^2(1)$	*p*
33.35	.001	.904	.169	.08	.777	5.76	.016
12.11	.437	.999	.012	2.42	.120	.26	.610
31.21	.002	.888	.161	.23	.632	.12	.729
34.75	.001	.866	.175	1.74	.187	.53	.467
11.28	.505	1.000	.000	.44	.507	1.10	.294

Discussion

This study examined the effectiveness of depression prevention on anxiety, suicidality, somatic symptoms, and perfectionism in an implemented depression prevention approach for adolescents with elevated depressive symptoms. The findings from the present study showed that anxiety decreased significantly in both conditions and that the decrease was significantly greater in the intervention condition than the control condition. Furthermore, somatic symptoms and concerns about mistakes and doubts perfectionism decreased significantly in the intervention condition, and suicidality decreased significantly in the control condition. However, the decreases in somatic symptoms, concerns about mistakes and doubts perfectionism, and suicidality did not significantly differ between the two conditions. In addition to the significant effect on depressive symptoms (de Jonge-Heesen et al., 2020), these findings show that the integrated prevention approach in this study might have broader effects than targeting depressive symptoms.

The significant effect of the depression prevention program on anxiety is encouraging, considering the evidence that 10—50% of the adolescents have comorbid levels of depression and anxiety (Garber & Weersing, 2010; Scholten et al., 2013), and that the presence of comorbid anxiety predicts a severity in depressive symptoms (Frank, Titone, Kagan, Alloy, & Kendall, 2020; O'Neil, Podell, Benjamin, & Kendall, 2010). In addition, the presence of both depression and anxiety predicts worse outcomes (e.g., increased risk of recurrence or poor treatment response) than either of these alone (Birmaher, Ryan, Williamson, Brent, & Kaufman, 1996; Dold et al., 2017; Rhebergen et al., 2011). The present study suggests that screening for depressive symptoms and providing a CBT depression prevention program for adolescents with elevated depressive symptoms can decrease comorbid symptoms of anxiety, and therefore has the potential to ensure better outcomes.

This finding is in line with research showing that CBT is effective for a wide range of emotional problems, including symptoms of anxiety (Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). Although CBT programs for anxiety and depression vary in the strategies that are included, they share the same focus, which is cognitive restructuring by teaching the interplay between thoughts, feelings, and behaviors. Moreover, the CBT techniques might focus on the fundamental cognitive distortions that underlie both anxiety and depression (Garber et al., 2016). For example, the fear of rejection or the belief that one is not capable enough can cause both depressive symptoms and symptoms of anxiety. This overlap in techniques and focus might account for the significant effect of depression prevention on anxiety (Barlow et al., 2017; Caspi & Moffitt, 2018).

However, the effect of depression prevention on anxiety is in contrast with Garber et al. (2016), who tested in a meta-analytic review the cross-over effects of anxiety programs on depressive symptoms, and of depression programs on symptoms of anxiety. They found crossover effects for both depression and anxiety in treatment programs but not in targeted prevention programs, concluding that treatments for anxiety and depression may have broader effects than just the target they aimed at, but that prevention programs do not. Yet the review was focused on effects directly after treatment, which might underestimate prevention effects, as in our RCT significant effects were found one year after the program. Also, the mean level of depressive symptoms in our sample was near the level of clinical symptoms (M = 15.76, clinical symptom level ≥ 14), which might indicate that our findings are more comparable with treatment effects.

Still, the fact that despite the high comorbidity with depressive symptoms and their shared etiology, CBT depression prevention was not significantly more effective in the reduction of suicidality, somatic symptoms, and perfectionism than psycho-education, is thought-provoking. One explanation might be found in the content of the prevention program, which might not be sufficient in targeting these symptoms. Considering the content and therapeutic elements in interventions that target suicidality, somatic symptoms, and perfectionism, there are specific techniques that were not included in our prevention approach. For example, studies on adults support the use of CBT in the treatment of somatic symptoms, with 6—16 sessions of CBT leading to a reduction in symptoms (Mohapatra, Deo, Satapathy, & Rath, 2014). Yet these treatments include, besides the traditional CBT techniques, techniques that are more body oriented, such as relaxation techniques, mindfulness, guided imagery, and techniques that deal with specific somatic symptoms (Gupta Karkhanis & Winsler, 2016). Mindfulness is also suggested by researchers as an effective technique for treating perfectionism, in particular by learning to disengage from repetitive negative thinking (Huang et al., 2020). Furthermore, programs aimed at the reduction of suicidality contain interventions that differ from traditional CBT programs, such as techniques to increase help-seeking behavior, social support, and safety behavior (Wenzel, Brown, & Beck, 2009). So, although CBT might have some benefits for these symptoms, they might require alternative or at least additional techniques.

According to this interpretation, the fact that not all comorbid problems respond to the same prevention strategy has some important implications for future research as well as for clinical practice. Since our main findings show that there is a substantial group of adolescents who did not respond to the CBT prevention in terms of a decrease in depressive symptoms (61.7%), we need to examine how prevention effects can be maximized. It is possible that there is a group of adolescents who did not respond to CBT prevention because of comorbid symptoms that impede the prevention effect. Arguing that the

presence of certain symptoms, for instance perfectionism, calls for another intervention might also suggest that CBT is less effective in reducing depressive symptoms when there is comorbid perfectionism. Although future research should disentangle this further, more knowledge about the group of non-responders might lead to a more personalized prevention approach.

Strengths and Limitations

The most important strengths of this study are the longitudinal design, the use of an active control group, and the implementation of preventive interventions in school communities. These strengths made it possible to examine the effectiveness of OVK 2.0 under real life conditions and to make substantial conclusions about the effectiveness. Also, the results are generalizable as the sample include both boys and girls from different school levels. Still, this study has some limitations. Although the sample was large enough to examine the effect on the outcome variables, it was insufficient to examine the effect on outcomes variables when controlling for depressive symptoms or as moderators in the effect on depressive symptoms. Such analyses would provide more information about the underlying mechanism of prevention and the additional effect of prevention on related symptoms when accounting for depressive symptoms. In addition, only 27% of the adolescents who emerged from the screening were willing to participate in the study, and therefore, selection bias must be considered (see also de Jonge-Heesen et al., 2020). Other limitations are the reliance on self-reports only, which might have caused socially desirable behavior, the lack of measurement of the fidelity of psycho-eduction, and the possible performance and assessment biases as allocation was not concealed. Finally, randomization was carried out on school level, which limited the random allocation of adolescents.

Conclusions

The findings of the present study show that integrated depression prevention seems to be effective in reducing symptoms of anxiety in adolescents with elevated depressive symptoms. Although these symptoms frequently co-occur with depressive symptoms and share the same risk factors, we argue that additional techniques are necessary to target these problems. Regarding suicidality, we recommend future prevention studies to continue monitoring the effect of prevention programs on symptoms of suicidality (with appropriate risk management). Although just a small number of adolescents with suicidal ideation proceed to make an actual suicide attempt, the consequences for the environment are tremendous and we are obliged to do everything we can to decrease the number of suicides at this young age.

In conclusion, given the high prevalence rates of depression in adolescents and the poor outcomes when there is comorbid anxiety, these findings are hopeful. Therefore, this study provides further support for the implementation of an implemented prevention approach in which adolescents with elevated risk for depression are identified and offered an evidence-based prevention program to reduce the risk of developing depression or other negative outcomes.

Appendix

Table A

Correlations between Study Variables and Depressive Symptoms

	Depressive symptoms T1	Depressive symptoms T2	Depressive symptoms T3	Depressive symptoms T4
Anxiety T1	.73***	.40***	.38***	.39***
Anxiety T2	.49***	.75***	.59***	.62***
Anxiety T3	.44***	.53***	.74***	.59***
Anxiety T4	.39***	.58***	.64***	.73***
Suicidality T1	.65***	.47***	.42***	.37***
Suicidality T2	.46***	.68***	.57***	.50***
Suicidality T3	.54***	.68***	.74***	.61***
Suicidality T4	.48***	.60***	.65***	.70***
Somatic symptoms T1	.50***	.31**	.23*	.18
Somatic symptoms T2	.43***	.63***	.53***	.45***
Somatic symptoms T3	.51***	.61***	.65***	.54***
Somatic symptoms T4	.41***	.49***	.48***	.45***
PS perfectionism T1	.25**	.12	.17	.15
PS perfectionism T2	.23*	.29**	.28*	.26*
PS perfectionism T3	.33**	.33**	.50***	.36***
PS perfectionism T4	.24*	.30**	.36***	.32**
CMD perfectionism T1	.53***	.33**	.31**	.25*
CMD perfectionism T2	.33**	.58***	.48***	.42***
CMD perfectionism T3	.36***	.50***	.68***	.50***
CMD perfectionism T4	.31**	.50***	.57***	.59***

*$p < .05$; **$p < .01$; ***$p < .001$.

Chapter 7

General discussion

Study aims

The aim of current dissertation was to a) examine coping and perfectionism in relation to depressive symptoms and suicidality; and b) to test the effectiveness of a collaborative depression prevention approach in adolescents. This approach includes: 1) early screening for depressive symptoms and suicidal ideation; adolescents with acute suicidal ideation were directly referred for treatment; and 2) an indicated prevention program based on CBT for adolescents with elevated depressive symptoms. We used an RCT design to establish if prevention effects were maintained when this approach was fully implemented in the school context. We tested if the prevention approach was effective in reducing depressive symptoms according to adolescents and parents, depression diagnoses, and other symptoms that are related to depression.

We start this general discussion with the findings and relevance of the studies in which coping and perfectionism were examined as risk factors for depression and suicidality. The information gained from these empirical studies is beneficial for our understanding of the early adolescent phase, the development of depression and suicidality, and therefore for the improvement of subsequent prevention programs. Building on these theoretical findings, the findings of the RCT are reviewed and discussed in the context of research and clinical implications.

Summary of main findings

Chapters 2 and 3 represent the empirical studies in this dissertation. In Chapter 2, the bidirectional associations between five coping strategies (problem focusing, positive cognitive reframing, avoidance, dissociation, and seeking support) and depressive symptoms are examined over time in a large sample of adolescents aged between 11 and 14 years. None of the coping strategies predicted depressive symptoms over time. However, the existence of a reverse relationship was indicated. When adolescents experienced elevated depressive symptoms, they used fewer adaptive techniques to target stress, over time. Small gender differences were found in the use of avoidance as a coping strategy. For boys, a higher score for depressive symptoms was related to a decrease in avoidance strategies. For girls, a higher score for depressive symptoms was related to an increase in avoidance and distraction strategies. These findings indicate that the level at which specific strategies are used is not related to the development of depressive symptoms. However, when an adolescent experienced elevated depressive symptoms, this was related to lower use of active problem-solving strategies.

Coping is further examined as a moderating factor in Chapter 3. We examined the association between perfectionism and suicidality in a cross-sectional study design in adolescents aged between 12 and 15 years old. Coping was expected to act as a buffer

or strengthen this association. The findings showed that higher scores on both personal standards perfectionism and concerns about mistakes and doubts perfectionism were related to an increase in suicidality. The association between perfectionism and suicidality was stronger in the presence of high levels of maladaptive coping strategies. Adaptive coping was related to lower levels of suicidality but had no buffering function in the association between perfectionism and suicidality. The findings suggest that high levels of perfectionism could have unhealthy downsides, and it seems more important to unlearn maladaptive coping strategies than to teach adaptive coping skills in adolescents high in perfectionism.

Chapters 4, 5, and 6 describe the RCT which was used to investigate the effectiveness of a collaborative care approach to depression prevention. Firstly, we presented the study protocol in which we included the study design, outcome measurements, and analysis plan (Chapter 4). The main study was then presented in which a total of 130 adolescents aged between 11 and 15 years with elevated depressive symptoms were randomly assigned to OVK 2.0 (experimental condition) or psycho-education (control condition). The participants and their parent completed questionnaires at baseline, post-intervention, and at six months and one-year follow-up. Findings revealed that depressive symptoms in adolescents in both conditions significantly decreased over time, although this decrease was significantly stronger for adolescents in the OVK 2.0 condition. Depressive symptoms decreased in both conditions according to parents, but there was no significant difference in this decrease between conditions (Chapter 5). Lastly, the effectiveness of the implemented depression prevention approach on anxiety, suicidality, somatic complaints, and perfectionism was explored. We found a decrease in anxiety which was significantly larger in the OVK 2.0 condition (Chapter 6). Taken together, these studies provide evidence that this method of depression prevention is effective in reducing symptoms of depression and anxiety in adolescents. The importance of these findings and our recommendations are discussed in the second part of this general discussion.

Reflections on main findings

Adolescence is a critical phase that forms the base for adulthood as new capacities and abilities are acquired that are important for, for example, future healthy relationships, self-regulation, and cognitive reasoning (Harper, Waite, & Loschert, 2018). The interplay between biological, cognitive, and social processes can give rise to the onset or continuation of emotional problems such as depressive symptoms. Still, not all adolescents develop depressive symptoms, and this makes it interesting to investigate why some adolescents develop symptoms and others do not.

Coping

Coping is one factor that has shown a crucial role in the development of psychopathology during adolescence (Compas et al., 2017; Zimmer-Gembeck & Skinner, 2016). Nevertheless, our studies on the bidirectional and longitudinal associations between coping strategies and depressive symptoms, and the moderating role of coping in the association between perfectionism and suicidality, brings this into question. Our findings show a discrepancy between research and theoretical models stating that coping is associated with the development of depressive symptoms. One possible explanation for this discrepancy is that assumptions of the effects of coping are overestimated (see also Chapter 2) while the effects of other contributing factors, such as negative life events, are underestimated. For example, the cultivation of coping strategies in childhood might be very different for children that are exposed to high stress levels due to maltreatment including, physical, sexual, and/or emotional abuse compared to children who are not exposed to maltreatment. Experiencing childhood maltreatment seems to disturb the general process of regulating emotions, stimulating the use of maladaptive coping strategies such as suppression and avoidance. These strategies might be helpful in situations of maltreatment, but the continuation of these strategies in non-maltreatment situations can be detrimental to the normative developmental process (Compas et al., 2017; Gruhn & Compas, 2020), and teaching these children better coping skills is essential to prevent adjustment problems over time (Appleyard, Egeland, van Dulmen, & Alan Sroufe, 2005). The majority of adolescents do not experience such stressful life events, and their coping strategies might be rather stable with predominantly adaptive coping strategies.

So, insights into coping could improve prevention programs, but this might be relevant only to those adolescents that have difficulties with adaptive coping due to stressful life experiences. Therefore, in the continuation of coping research, it might be important to differentiate between adolescents who have and have not experienced highly stressful life-events and to focus on those adolescents who have been exposed to stress, as learning adaptive coping skills might be crucial for them to prevent the development of psychopathology.

Despite the importance of the continuation of coping research, coping has some important limitations which future research should address. Firstly, the heterogeneity between coping questionnaires and the strategies included is indicative of the complexity of the concept of coping. There is little consensus on the definition and classification of the coping construct, and there are many measures available. To illustrate, coping can be subdivided into primary, secondary, and disengagement coping (Compas et al., 2001); into problem-focused and emotion-focused coping (Lazarus & Folkman, 1984); some studies use the term ‘coping’ (e.g., Zimmer-Gembeck & Skinner, 2016) whereas others use the term ‘emotion regulation’ (Thompson & Goodman, 2010); and some argue that emotion regulation refers

to the processes in coping, with elevated levels of emotions (Kopp, 1989). Although the key feature in all conceptualizations is the regulatory process (Compas et al., 2017), this heterogeneity, or, to put it differently, the lack of clarity in concepts and operationalizations, makes coping research challenging.

Secondly, it is difficult to interpret findings when analyzing coping strategies separately because there is much overlap between strategies (Compas et al., 2017). Also, we do not know what the optimum composition of strategies is in reaction to stress, nor how to devise this. The investigation of single strategies is in contrast with the set of multiple strategies that people use when facing problems (Dixon-Gordon, Aldao, & De Los Reyes, 2015), and dividing coping strategies into adaptive and maladaptive strategies might be oversimplifying, because an adaptive strategy might have a maladaptive outcome and vice versa (e.g., Aldao, 2013). Moreover, longitudinal studies have discovered that coping is dynamic and adolescents might switch from a preference for a specific coping style (Zimmer-Gembeck & Skinner, 2010). Facing the demand for a more dynamic methodology to investigate the concept of coping, a promising solution is a person-centered and data-driven tool that reveals the profile of adolescents who use similar coping strategy patterns (Aldao, 2013; Dixon-Gordon et al., 2015; Lougheed & Hollenstein, 2012; van den Heuvel et al., 2020). This could provide more insight into whether different strategy patterns (e.g., an average use of all strategies or a frequent use of disengaging strategies) are differently related to depressive symptoms. Also, it has the potential to outline trajectories of change and thus show at which age coping profiles are most sensitive to change, and therefore the optimum moment to adapt coping skills. The coping research could benefit from such methodology as it deals with the most important challenges that coping entails.

Perfectionism as mental health risk

Perfectionism is often perceived as a personality trait that it is helpful to have. This makes sense, as a considerable amount of research suggests that having high goals and standards perfectionism, is related to an increased academic engagement and achievement (e.g., Damian et al., 2017; Madigan, 2019). Conversely, there are studies that show that personal standards perfectionism is associated with side-effects of this high achieving, such as workaholism (Stoeber & Damian, 2016). In Chapter 3, the pernicious role of perfectionism is described, showing that high levels of perfectionism, in terms of having high personal standards as well as evaluative concerns perfectionism, are related to increased suicidality. This is in line with the meta-analytic review of Smith et al. (2018), showing that elevated characteristics of either personal standards perfectionism or evaluative concerns perfectionism are related to suicidality. The authors suggest that the pursuit of perfectionism causes so much psychological pain

that, in a wish to escape from this pain, people engage in suicidal thoughts and/or behaviors. Considering this, we can conclude that perfectionism may be harmful for (mental) health, and that it is not a characteristic that should be encouraged.

However, perfectionism is in some way intertwined with our society. Adolescents are expected to do the best they can in schools, and a perfectionist attitude is encouraged in sport programs for children and adolescents (Flett & Hewitt, 2005) and on social media channels, which include perfectionistic self-presentation and non-disclosure of imperfection (Hellmann, 2016). Although the majority of adolescents are able to cope with this kind of pressure, awareness of the downside of perfectionism is important, especially because recent studies suggest that some adolescents are experiencing growing school pressure and increasing worry about academic achievement and future perspectives (Bor, Dean, Najman, & Hayatbakhsh, 2014; Curran & Hill, 2019; De Looze et al., 2020; Stevens et al., 2018). It is important to examine whether this trend is ongoing and is reflected in an increase in perfectionism, as this might reflect a problem that is rooted in our society.

The harmfulness of high levels of perfectionism is also reflected in the response to treatment. People high in perfectionism have a greater risk of poorer treatment outcomes in general due to an overcritical and/or demanding attitude which might frustrate the therapeutic alliance (Hewitt, Chen, et al., 2020). For example, Jacobs et al. (2009) found that depression treatment in the form of CBT or a combination of CBT with medication was not effective in reducing depressive symptoms in adolescents with higher perfectionism scores. Patients who were not able to show their vulnerabilities or imperfections and who required perfectionism from others, were seen as hostile by clinicians. In addition, patients high in personal standards perfectionism or concerns over mistakes and doubts perfectionism were rated by clinicians as less favorable (Hewitt, Chen, et al., 2020). Moreover, people high in perfectionism often already have negative or unrealistic expectations of treatment before they have even seen the therapist (Shannon, Goldberg, Flett, & Hewitt, 2018).

There is no evidence yet to point to a potential complicating role of perfectionism in prevention. Future studies should investigate if the presence of high levels of perfectionism prevents adolescents' improvement through prevention programs. In addition, our findings regarding perfectionism and suicidality in early adolescents should be replicated in longitudinal designs to prove causality. Given the burden of suicidality, an increased understanding of adolescents at-risk for suicide would be very valuable as early identification and treatment of suicidality might add to the prevention of suicide in adolescence.

Assessment of suicidality

Due to the strong comorbidity with depression, the relatively high incidence of suicidal ideation in adolescents, and the profound consequences of a suicide or suicide attempt (Kerkhof, 2002), suicidality has a prominent place in this dissertation. Our study on the association between perfectionism and suicidality in a general sample of adolescents between 12 and 15 years old shows that suicidal behavior and ideation is not rare in adolescence. Of the 273 adolescents in the sample, 5.5% reported having self-harmed once and 3.3% several times. The incidence of suicidal ideation was 11.8% and two adolescents reported a suicide attempt in the past. Considering that this was a general sample of adolescents, these rates might be even higher in the sample in our RCT, which included adolescents with elevated depressive symptoms. Indeed, 40% of the 130 adolescents participating in our study suffered from suicidal ideation and 8.3% reported having self-harmed once and 5.5% several times. Eleven adolescents reported a suicide attempt and during the RCT study we were confronted with suicide attempts by two girls in our sample[1]. Remarkably, suicidality is often not mentioned in depression prevention programs and items on suicidality are often removed from questionnaires for 'ethical reasons' or at the request of school administrators (e.g., Brunwasser, Freres, & Gillham, 2018; Gillham et al., 2012; Tak et al., 2016). Even more striking are the studies that did include one or more items to measure suicidality but did not describe appropriate risk management when adolescents actually reported suicidality (e.g., Cardemil, Reivich, & Seligman, 2002; Gillham, Reivich, Freres, Chaplin, Shatté, et al., 2007). We argue that suicidality is an inevitable subject in depression prevention that should not be avoided.

The fundamental reason for omitting suicide questions in studies might be the persistent fear or uncertainty that asking or talking about suicide will encourage suicidal ideation or behavior. Multiple studies show that enquiring about suicide does not cause an increase in suicidal tendencies (Crawford et al., 2011; Cukrowicz, Smith, & Poindexter, 2010; Dazzi, Gribble, Wessely, & Fear, 2014; Deeley & Love, 2010; Gould et al., 2005; Robinson, Hetrick, & Martin, 2011). In fact, suicidal thoughts and behaviors were shown to reduce when acknowledged (Dazzi et al., 2014). This is also reflected in our RCT on secondary outcomes, showing that suicidality decreased in both the psycho-education and the OVK 2.0 condition. Therefore, ethical concerns might be unnecessary and screening for suicidality should instead be encouraged. Moreover, screening for suicidality can provide direct benefits, as illustrated in our RCT. We identified 13 adolescents who were at a very high risk for suicide and needed treatment, of whom three adolescents were at such a high risk that

1 These attempts were reported as Serious Adverse Events according to the guidelines of the Central Committee on Research Involving Human Subjects. Both adolescents were under treatment for depressive symptoms when they attempted suicide.

immediate help was necessary. This contributes to the existing evidence that standardized screening for suicide risk can identify adolescents at high risk for suicide who need referral for treatment immediately before they make a serious or fatal suicide attempt (Horowitz & Ballard, 2009; Wintersteen, 2010).

Prevention of depression

The effectiveness of the prevention approach described and tested in this dissertation when implemented under real life circumstances is promising. We assume that there are several reasons underlying this positive outcome. Firstly, the program has a strong focus on CBT which has been shown to be an evidence-based framework for both depression intervention and prevention (Callahan, Liu, Purcell, Parker, & Hetrick, 2012). CBT is also the first choice technique for the prevention and treatment of anxiety (Van Balkom et al., 2013), which might be an important reason that OVK 2.0 was also effective in reducing symptoms of anxiety. In each session, CBT techniques were trained and adapted to adolescents' own situation. In addition, the training was given by a licensed psychologist to ensure quality, and assisted by a co-trainer, who could be a member of the school staff or a mental health care worker. Both the main trainer and the co-trainer were intensively trained on a three-day course by experienced professionals to guarantee qualified training. Secondly, due to the strong focus on partnership in the collaborative care model, there was consistency in the care provided. Mentors, school psychologists, school nurses, researchers, and mental health care providers worked together and each was aware of his or her responsibilities in the collaboration. Collaborative care has been shown to be more effective in treating depression than usual care (Archer et al., 2012; Richardson et al., 2014) and the positive effects of a shared mission that is underlined by each collaboration partner, in combination with screening and monitoring, evidence-based working, and enhanced interprofessional communication might be underlying the successful outcomes of our RCT.

Furthermore, the network increased in quality and professionalism—for instance, by providing training for school nurses and medical officers in interviewing for suicidality and educational workshops for teachers about depression and suicidality in adolescence. This approach is in line with the vision of the European Alliance Against Depression (EAAD). The mission of the EAAD is to initiate community-based interventions on a regional and national level in many countries in Europe using a four-level approach, including: 1) specific education for GPs and pediatricians; 2) general depression awareness campaign; 3) initiatives to support high-risk groups including adolescents; and 4) disseminating knowledge in the network around at-risk groups. The EAAD found that this approach seemed to improve the care for depressed patients and reduce suicides (Hegerl, Althaus,

Schmidtke, & Niklewski, 2006; Hegerl, Rummel-Kluge, Värnik, Arensman, & Koburger, 2013). This underlines our clinical experience, that collaboration in a shared mission contributes to professionalizing and improved care. The structured four-level approach of the EAAD by which the dissemination of knowledge to the outside world or networks around at-risk groups is organized may be a good addition to the STORM model in order to the take depression prevention to the next level.

Challenges

Although we consider the prevention approach included in this dissertation a promising way to implement depression prevention on a larger scale, some remaining questions and issues need to be addressed. Firstly, an obvious question is whether prevention can still be defined as prevention when the participants that are included have scores in the clinical range for depression. The participants in our study had mean scores above 18 during the screening, which is significantly higher than the cut-off of 16 which indicates the presence of clinical symptoms. Moreover, 19 adolescents met the criteria for a depressive disorder. Therefore, the effect that we found might be considered an early intervention effect rather than a prevention effect. In future trials, it might be pivotal and valuable to clarify the effects of prevention by including the severity of symptoms as a moderator. However, differentiating between prevention or early intervention is not so much of importance for implementation. Given that many adolescents with a depressive disorder do not receive treatment right now, a decrease in depressive symptoms or a reduction in diagnoses would be of great value (Hetrick et al., 2016).

A second issue concerns the relatively low number of adolescents participating in the RCT. Considering that 469 adolescents had elevated scores for depressive symptoms, it is rather disappointing that only 130 adolescents (28%) agreed to participate. This clearly shows that there is a large group of adolescents who suffer from psychological issues but refrain from obtaining (and seeking) help. In our study, the most important reasons not to enroll were unawareness among parents and adolescents of the presence of depressive symptoms, seeing the prevention program as unnecessary, and the absence of motivation for the prevention program in the adolescent. So, although the need for depression prevention might be acknowledged, actual participation in prevention programs seems a bridge too far. Additionally, research has found that stigma and practical barriers are the most important reasons for not seeking help or engaging in mental health care (Haugen, McCrillis, Smid, & Nijdam, 2017). Naturally, practical barriers to participation should be dealt with first. For instance, schools might prefer the prevention program sessions in after-school hours, but this should be avoided as it will limit the time for adolescents' homework, friends, and chill time, which might be an important barrier to participation. Furthermore, future studies should examine the effectiveness of means of maximizing enrollment—for example,

by introducing school lessons about mental health and organizing information evenings for parents. Also, school projects, assignments, or rewards in the form of study credits may be used to stimulate adolescents to take care of their mental health and increase the motivation for participation in prevention programs. By improving the enrollment in such programs, we are more able to examine the effectiveness of prevention without participation biases.

Still, the issues discussed above in some way display the unfamiliarity with the concept of depression prevention. In line with the Global Consortium of Depression Prevention, we argue that depression prevention is now at a point at which our knowledge about effective strategies should be deployed in order to implement evidence-based prevention strategies and strengthen dissemination efforts (Cuijpers et al., 2012). By establishing the position of depression prevention, just like the prevention of, for example, obesity or cardiovascular disease, depression prevention becomes more self-evident and might create an awareness which naturally helps to reduce stigma. We will provide some suggestions for future research and clinical practice that might contribute to this ambition.

Future research

There are several issues that provide opportunities for future research. Firstly, although we recommend the implementation of depression prevention according to the principles in our study, we did not include an assessment to study the quality of implementation. Therefore, we are not able to make statements about the success of implementation. Future studies should examine the possibilities and challenges for implementation on a large scale. Examination of the STORM approach by another team in a different region might further substantiate the potential for systematic implementation. Secondly, the cost-effectiveness of this prevention approach should be investigated. Although several studies show that screening for depressive symptoms and providing prevention to people at risk is cost-effective (Mihalopoulos, Vos, Pirkis, & Carter, 2012; Ssegonja et al., 2020), replication of these studies in the Netherlands is needed.

Also, future research could play a crucial role in examining how the effectiveness of prevention can be maximized. The main findings of our RCT revealed that 61.7% of the adolescents in the intervention condition did not show a decrease in depressive symptoms. Knowing which adolescents do not respond to (this type of) depression prevention is very relevant to increase the effectiveness for prevention. So far, child factors that have proved to moderate depression prevention effects in a negative way are having a depressed parent, childhood trauma, higher reporting of symptoms of depression, hopelessness, anxiety, substance use, a low motivation

to reduce depressive symptoms, and lower intellectual functioning (Conejo-Cerón et al., 2020; Garber et al., 2018; Weersing et al., 2016). Additionally, we suggested earlier that perfectionism as an underlying construct might hinder prevention effects. Identifying specific risk factors that hinder prevention effects should be the topic of future research in order to enhance the number of adolescents that can benefit from depression prevention.

The non-response could also be due to the content of the program, which is very cognitive and might not appeal to everyone. Therefore, alternative programs such as mindfulness-based interventions, self-help, or interpersonal therapy-based programs (IPT) may be considered. Unlike CBT, mindfulness is not focused on modifying thinking patterns but more on acceptance of all kinds of stimuli as part of the cultivation of an awareness of present moment experiences (Shonin, Van Gordon, & Griffiths, 2012). More recently, mindfulness programs have gained popularity as universal programs in schools to promote mental health. Research has shown that mindfulness-based school programs reduce depressive symptoms and stress levels and improve well-being and cognitive performance (Kuyken et al., 2017; Raes, Griffith, Van der Gucht, & Williams, 2014; Zenner, Herrnleben-Kurz, & Walach, 2014). Although mindfulness seems promising for universal depression prevention, no study to date, to our knowledge, has examined mindfulness as an indicated depression prevention program in adolescents.

Furthermore, self-help methods, such as self-help websites, games and apps, can serve as an alternative to CBT. SPARX is an example of a computerized self-help program that can be helpful to practice CBT techniques in a fantasy game-based video game (Merry, Stasiak, et al., 2012). Although less effective than CBT, our RCT shows that psycho-education as a form of self-help was effective in reducing symptoms of depression. In addition, self-help might better suit adolescents' preference, as research shows that adolescents prefer to rely on themselves when they experience problems, and that this is a common barrier to seeking external help (Gulliver, Griffiths, & Christensen, 2010). Self-management might therefore also serve as an alternative for adolescents experiencing depressive symptoms who do not want to participate in prevention programs.

Lastly, IPT addresses interpersonal problems out of the idea that interpersonal conflicts, difficulties with role transitions, and experiences of loss are important risk factors for depressive symptoms, and resolving these problems decreases interpersonal stress and increases social support, which ultimately prevents symptoms of depression (Lipsitz & Markowitz, 2013). IPT has been shown to be effective in the prevention of depression in adolescence (Horowitz, Garber, Ciesla, Young, & Mufson, 2007; Young et al., 2016; Young, Mufson, & Davies, 2006; Young et al., 2010), although the number of studies examining IPT as prevention is limited. Still, IPT could be especially beneficial for adolescents for whom interpersonal problems underlie their depressive symptoms. Also, IPT could tackle

underlying perfectionism, as the perfectionism social disconnection model states that perceived disconnection from others and hypersensitivity to rejection cause depressive symptoms (Flett, Besser, & Hewitt, 2014; Hewitt et al., 2006).

To meet the different needs of individuals, a direction that might be worth pursuing is the possible benefits of matched care. Matched care suggests that prevention or intervention might be more effective if there is a match between the techniques that are targeted in the program and the individual risk, needs, and comorbid problems (Hankin, 2020; Weisz et al., 2012). A recent study by Young et al. (2020) showed that matched prevention care has promising implications. In this study, adolescents were screened for cognitive and interpersonal risk and randomly assigned to interpersonal therapy or a CBT-based program focused on cognitive distortions. The results show that there was no difference between these programs in terms of effectiveness. However, when adolescents received a program that was matched to their highest risk dimension, they reported a greater decrease in depressive symptoms over time compared to adolescents who received a mismatch. Although this approach might be challenging for prevention due to the complexity involved in screening and providing different programs, such precision prevention (what works for whom?; Hamburg & Collins, 2010) for adolescents with a more severe risk factor profile might be very helpful—for example, by referring adolescents with a high level of depressive symptoms and the presence of several risk factors, that did not respond to a CBT prevention program, for second-line instead of first-line treatment. This might prevent them being exposed to ineffective first-line treatments and therefore reduce the time taken to recover from depressive symptoms (Cohen & DeRubeis, 2018).

Clinical implications

With the aim of strengthening the resilience of adolescents at risk of depression and to ensure that symptoms of depression and/or suicidality are timely identified and targeted, we advocate prevention on a larger scale and structurally imbedded in youth care. A collaborative care model such as that used in this dissertation—including an active and multi-professional approach to depression prevention in adolescents; enhanced interprofessional communication; a focus on professionalizing and improving the process of care; evidence-based approaches by using programs that have proved their effectiveness; and using outcome measures (monitoring) to drive clinical decision-making—lends itself as an example. Figure 1 illustrates how the core values of collaborative care are applied to STORM. The triangle within this model shows the active and multi-professional approach, around which are the conditions and values that make this model work.

Figure 1. Collaborative Depression Prevention Model (STORM).

Although we argue that a collaborative care approach such as STORM is needed for sustainable implementation of depression prevention, there is room for improvement.

Firstly, the involvement of parents in the prevention approach was minimal, and this is something that should be addressed. Because of the young age of these early adolescents particularly, parents fulfill an important role in the identification, maintenance, and prevention of depressive symptoms. Although programs that included parent components in the prevention program itself were generally not more effective in reducing depressive symptoms than programs without a parent component (e.g., Clarke, Rohde, Lewinsohn, Hops, & Seeley, 1999; Gillham et al., 2012), we argue that parents should be involved in the process of prevention. While doing our fieldwork for the study, we experienced that parents played a major role in the decision of whether or not to participate, and providing them more insights regarding depression, risk factors, and the program might ensure that parents understand the potential of prevention. Moreover, we experienced that parents lacked knowledge about moodiness versus depression and that parents were unaware of where they could find such information. The provision of this kind of knowledge must be improved and may ultimately contribute to an increase in the number of adolescents that participate in prevention programs.

Next, we experienced that the implementation of depression prevention, and this specific regional collaboration, caused a more overall awareness of depression and suicidality among teachers, mentors, and care providers. Creating such a network of informed professionals is also encouraged in national and international guidelines on depression and suicidality as being important for early identification and prevention (NICE, 2019; Purebl et al., 2015; Trimbos-Institute, 2009; Zuckerbrot et al., 2018). Enlarging the network of people among adolescents that are aware of the expression of symptoms of depression and suicidality and know how to react to these symptoms might be an important elaboration of the prevention approach in this dissertation. An example of a training that tries to extend this safety network is that of gate-keepers. This training is intended for all professionals who have contact with adolescents, such as teachers and sport trainers, but also the concierge or police. This training teaches how to identify and respond to suicidality. So far, the training of gate-keepers has proved to be helpful in the process of referral of high-risk adolescents and it provides better knowledge and more confidence in enquiring about suicide (Condron et al., 2015; Rodi et al., 2012; Terpstra et al., 2018). Combined with the prevention approach in this dissertation and more awareness of the role of parents in depression prevention, this would provide a setting in which high-risk adolescents could be timely identified in order to prevent negative outcomes.

Lastly, regarding the implementation of collaborative depression prevention, it is wise to take into account the barriers that are associated with collaborative care. A collaborative care approach has some challenges and barriers which generally fall into the three following categories: 1) clinical barriers, or barriers that interfere with participation and adherence, such as a stigmatizing attitude toward prevention, providers' problems delivering the program in line with the protocol, or communication problems between a care provider and the adolescent or parent; 2) organizational barriers, or barriers in the system that hinder implementation of the delivery of care, such as information-sharing barriers due to the protection of privacy, confusion about responsibilities, and the extra time it takes to make the collaboration work; and 3) financial barriers, such as dependence on time-limited grants or financing extra care tasks such as screening and the care management (Sanchez, 2017). Based on our clinical experience with implementation during the past five years, we provide several recommendations to overcome common barriers to practice implementation within the school community.

- Due to the strong focus on collaboration, the first and most important step is to create a network with healthcare and educational partners with a shared sense of ownership. All partners should underline the sense of urgency, support the aimed approach, and share the same vision of investing in sustainable depression prevention. A long-term commitment is needed as it takes time to organize, implement, and evaluate

such an approach. The most important partners in this collaboration are the public health service (GGD), the schools, mental health care, and the municipality. In addition, to ensure that the collaboration partners can work at their optimum level of efficiency, it is useful to select one or more project managers to support the process of collaboration. For the start-up of the collaboration and implementation, a project team is very helpful, in which the project managers cooperate with delegates of each collaborating organization.

- We recommend screening for symptoms with disorder-specific screening instruments that have been proved to be reliable and valid in order to ensure good quality screening (e.g., CDI-2; Bodden, Stikkelbroek, et al., 2016). In addition, it is best that screening takes place when depression rates start to rise at an age between 12 and 14 years—for example, in the second grade of secondary school, according to the Dutch school system. Screening and providing prevention at this early age also has benefits for the efficacy of prevention programs, as it is shown that prevention programs produce better outcomes when behavior and cognition are more amenable to change, rather than in late adolescence when behavior and cognitive patterns have become more rigid (Gladstone, Beardslee, & O'Connor, 2011). However, considering the recurrent nature of depression (Lewinsohn, Rohde, et al., 1999), a periodic check-up of depressive symptoms followed by prevention might be valuable.
- Schools have a crucial role in the core program as they provide the location, school psychologists, and the setting for screening. It is important that schools feel supported by the collaboration partners and that practical barriers are detached to relieve the pressure on schools. For example, prevention should take place in the rhythm of the school year and not start just before seasonal holidays. Ideally, screening should take place in the first four months of the school year and the prevention programs should start at the beginning of the second half of the year.
- To ensure the quality of depression prevention, it is crucial that all partners are well trained. The public health service should feel comfortable interviewing adolescents with elevated depressive symptoms or suicidal ideation and performing risk assessments, and school psychologists and other mental health care trainers should be well trained in CBT techniques. Specialized mental health care has great expertise in the treatment of depression and suicidality and should therefore be responsible for the distribution of their knowledge and expertise to the field, which demands an active and accessible attitude.
- Scientific research is essential to evaluate the effectiveness of this approach. Moreover, research adds to the model fidelity of this prevention approach, which is important in the process of implementation on a large scale as it makes it possible to compare results between regions. It is recommended that all partners are aware of and involved in the research output—for example, through an annual feedback at which results so far are shared. This way, research can be used to continue the process of development.

- The collaborative workflow has financial challenges, as fee-for-service billing negates those tasks that are not limited to face-to-face contact with adolescents, such as interprofessional communication and care management (Docherty et al., 2020). To deal with these challenges, we advocate structural grants that are managed and distributed by one of the collaboration partners. Those grant-givers should be included in the long-term goals and should agree to a commitment for years, ideally a minimum of ten years.

Closing statement

Based on our findings, we advise continuing with the implementation of the prevention approach according to the principles of 1) early screening for depressive symptoms and suicidal ideation, followed by clinical referral for students with acute suicidality; and 2) an evidence-based prevention program for adolescents with elevated depressive symptoms. OVK 2.0 was shown to be effective even when implemented under real world circumstances and is therefore, to our knowledge, the best current available depression prevention program in the Netherlands. Furthermore, we argue that the framework of collaboration between several organizations and health care providers is the fundamental basis for implementation and improvement. Nowadays, youth mental health care is highly fragmented in the Netherlands, and this approach might be not only a welcome antidote to this fragmentation but also a unique example of how regional collaboration networks with a shared sense of ownership can become more efficient and self-sufficient in organizing care. There is a strong awareness that depression prevention should be more integrated, structured, and unfragmented. This dissertation shows that this is possible and has potential for successful implementation on a large scale.

Epilogue

Pim: *Someone from the STORM program approached us exactly at the peak of this turbulent period. I was not depressed, but I was not doing well and decided to participate. The most important thing I learned during the training was to convert negative thoughts into more positive ones, which I experienced, makes life much easier. It is an overall change in mindset. I am now in the fourth grade of secondary school, and although I still struggle with 'must-do' things, I feel fine now. I still have fights with my parents, but the last time was two months ago. It was about my smartphone use, but the fight only took half an hour. Looking back, it was the combination of puberty, stress at home, difficulties with school, and the lack of real friends that caused feelings of sadness and frustration. At the moment, I try to invest more in social contacts as I experienced how important they are. I also try to do my best at school as I want to become a marine biologist.*

Parents of Pim: *At first, we were shocked when we were approached for the participation in STORM. We were unaware of Pims' feelings of sadness that underlay the anger, irritation, and frustration, and were not sure if participation was necessary. In consultation with Pim, we decided that he would participate but that he was not obliged to share with us what he learned during the training. This was sometimes difficult for us, but it worked for him. The training took place at a tipping point, and together with the decision that he would repeat second class and the decreasing intensity of puberty, things started to ease. We are now in a much calmer phase, which is pleasant. The time of frequent outbursts is over, and this confirms to us that this was a phase, although a pretty violent one. Pim has very clear ideas about his future and we are delighted to see that he has more social contacts on which he can rely. We are confident that he will find his way in the world.*

Appendix

Table A
Overview of the Content in OVK 2.0

Session	Content	Homework
Parent and adolescent meeting	Practical information and explanation of CBT.	
Introductory meeting	30-minutes conversation between trainers and adolescents to get to know each other and to discuss potential barriers to the training, such as school schedule.	
Session 1 Ready to start	Get to know each other, psycho-education about depressive symptoms, exploring different emotions and the diversity in their intensity.	Start to monitor mood at a fixed time daily, and write down each day the compliments given or kind acts that someone has shown.
Session 2 Talking to yourself	Identify thoughts, recognize thoughts as helpful or unhelpful, and explore the connection between events, thoughts, and emotions.	Continue to monitor mood and identify helpful and unhelpful thoughts of friends.
Session 3 Don't fall for it!	Get to know the three most common 'thinking traps'—catastrophizing, over-generalization, and black-and-white thinking—and learn to identify these.	Continue to monitor mood and write down one or two positive qualities of each member of the training group.
Session 4 Looking for evidence	Introduction to challenge the thinking traps by examining the evidence and separating thoughts from actual events.	Continue to monitor mood and a challenge to show an act of kindness to someone.
Session 5 Test your thoughts	Exercises to practice to challenge unhelpful thoughts, generate alternative thoughts, and formulate more helpful thoughts based on the evidence. Introduction of the exercise 'On the spot' in which participants have to generate alternative thoughts to unhelpful thoughts as fast as they can based on the learned techniques.	Continue to monitor mood and collect evidence for and against an unhelpful thought that is frequently present.

Table A
Continued

Session	Content	Homework
Session 6 Fortune-telling	Learn to challenge catastrophizing by evaluating the worst case, best case, and most likely scenario, and put thoughts into perspective. 'On the spot' exercise.	Continue to monitor mood and write down a blessing each day.
Session 7 Control your behavior	Pygmalion effect: learn that your behavior could contribute to the fulfillment of your expectations. Exercise to challenge thoughts and formulate alternative thoughts and behaviors.	Continue to monitor mood and set goals for the future.
Session 8 Full force forward!	Interactive quiz about the content of the training, recap, award certificate, and festive end.	

Appendix

References

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Appendix

Nederlandse samenvatting (Dutch summary)

Nederlandse samenvatting (Dutch summary)

De adolescentie staat voor de periode tussen de kinderjaren en volwassenheid. In deze transitie periode vinden veel veranderingen en ontwikkelingen plaats en dit kan spanning en onrust met zich meebrengen. Bijbehorende onzekerheid, ruzies met ouders en stemmingswisselingen maken dat adolescenten kwetsbaar zijn voor het ontwikkelen van depressieve klachten. Dit is ook te zien in de stijging van het aantal jongeren met een depressie gedurende de adolescentie; de prevalentie stijgt van 5% aan het begin van de adolescentie naar 20% aan het eind van de adolescentie. Depressieve klachten bij adolescenten worden vaak niet op tijd of helemaal niet herkend, doordat klachten zoals prikkelbaarheid, concentratieproblemen en veranderingen in slaappatronen worden toegeschreven aan de pubertijd. Hierdoor worden depressieve klachten vaak niet op tijd behandeld en kunnen ze zich ontwikkelen tot een depressie.

Een depressie is een psychische stoornis waarbij de klachten een negatieve impact hebben op hoe iemand denkt, voelt en functioneert in het dagelijks leven. Naast een sombere stemming of verlies van plezier in activiteiten kunnen ook klachten als irritatie, schuldgevoelens, verstoringen in slaap- en eetpatronen, verminderde concentratie, en terugkerende gedachten aan de dood voorkomen. De gevolgen van het doormaken van een depressie kunnen enorm zijn, zeker in de adolescentie waarin veel nieuwe vaardigheden worden aangeleerd. Zo zorgen onbehandelde depressieve klachten bij adolescenten op korte termijn voor een verhoogd risico op schooluitval, werkeloosheid, eenzaamheid en het ontwikkelen van andere mentale gezondheidsproblemen. Op lange termijn zijn onbehandelde klachten een belangrijke voorspeller voor terugkerende depressies in de volwassenheid. Preventie van depressie in de adolescentie is daarom cruciaal om deze negatieve gevolgen te voorkomen.

Hoewel een depressie als één stoornis wordt gezien, is de uitingsvorm bij iedereen anders, evenals de manier waarop de depressie is ontstaan. De meeste verklaringsmodellen bekijken de ontwikkeling van een depressie als het resultaat van de interactie tussen persoonlijke kwetsbaarheden en stress, die veroorzaakt wordt door levensgebeurtenissen. Daarbij zijn een genetische kwetsbaarheid en het meemaken van traumatische gebeurtenissen in de kindertijd, met name misbruik of verwaarlozing, belangrijke risicofactoren voor het ontwikkelen van klachten. Psychologische factoren zoals perfectionisme of coping kunnen ook zorgen voor een verhoogde kwetsbaarheid voor het ontwikkelen van een depressie en zijn vanuit preventie perspectief erg interessant, omdat deze factoren zich vaak in de adolescentie verder ontwikkelen. Onderzoek naar de samenhang tussen deze risico factoren enerzijds en depressieve klachten en suïcidaliteit anderzijds kan bijdragen aan het vroegtijdig signaleren van adolescenten met een verhoogd risico en het aanbieden van passend preventief aanbod.

Suïcidaliteit is sterk gerelateerd aan depressieve klachten en daarom een belangrijk onderwerp als het over preventie gaat. Er wordt over suïcidaliteit gesproken als er sprake is van suïcidale gedachten, bewuste zelfbeschadiging of suïcidepogingen, hetgeen een belangrijke risicofactor is voor suïcide. Met name suïcidale gedachten komen vaak voor bij adolescenten met een depressie, waarbij geschat wordt dat een derde van de jongeren met suïcidale gedachten, in zowel de klinische als niet-klinische populatie, overgaat tot een poging tot suïcide. Wereldwijd wordt suïcidaliteit onder jongeren als een groot probleem gezien. In Nederland is overlijden door een suïcide op dit moment de belangrijkste doodsoorzaak onder jongeren. Daarnaast is de schatting dat er tegenover elke 'geslaagde' suïcide 20 tot 25 pogingen tot suïcide staan. Zowel een poging als een daadwerkelijke suïcide hebben een enorme impact op iemands leven (zoals schaamte, permanente verwondingen of beëindiging van het leven) en de omgeving (rouw of angst voor herhaling). Het is daarom zeer belangrijk om in het proces van depressiepreventie ook aandacht te hebben voor suïcidaliteit.

Het organiseren van depressiepreventie

Gezien de ernst en de gevolgen van onbehandelde depressieve klachten is effectieve depressiepreventie cruciaal en duurzame implementatie hiervan zou een prioriteit moeten zijn. We weten inmiddels dat depressiepreventie effectief kan zijn, maar er zijn nog weinig tot geen studies die hebben aangetoond of depressiepreventie effectief is wanneer het volledig geïmplementeerd is in de praktijk van onderwijs en jeugdhulpverlening. Vaak worden programma's uitgevoerd ten behoeve van het onderzoek en is er geen continuering na afronding van het onderzoek. Daarnaast is het vaak lastig om de financiering rond te krijgen of is er weinig (politieke) support voor het opzetten van een preventieaanpak in bovenregionale samenhang. Het collaborative care model beschrijft een optimale samenwerking tussen meerdere partijen in de zorg met als doel het behandelen van grote groepen mensen die onnodig lijden door mentale problemen. Het model is oorspronkelijk ontwikkeld in de Verenigde Staten met als doel het behandelen van mensen met chronische ziekten en depressies in de eerste lijn. Belangrijke aspecten van het collaborative care model zijn het screenen en monitoren op klachten, het toepassen van effectief bewezen methodes, vergroten van interprofessionele communicatie, het hanteren van een gezamenlijk beleid en het vergroten van kennis en kunde bij professionals. In de behandeling van depressie laat de samenwerking, zoals beschreven in het model, veelbelovende effecten zien en het biedt dan ook mogelijkheden om dit toe te passen op het gebied van depressiepreventie bij adolescenten.

Strong Teens & Resilient Minds (STORM) is een collaborative care aanpak die zich richt op de preventie van depressie en suïcidaliteit bij adolescenten. STORM is in 2015 gestart in de regio Oss nadat een eerdere studie in deze regio liet zien dat het aanbieden van een preventieprogramma gebaseerd op cognitieve gedragstherapie (CGT) aan adolescenten met verhoogde depressieve klachten effectief was in het verminderen van klachten. De aanpak is daarbij gebaseerd op kennis over wat werkt op het gebied van depressiepreventie vanuit eerdere onderzoeken. Concreet resulteert dit in de volgende aanpak: 1) het jaarlijks screenen van jongeren in de tweede klas van de middelbare school op depressieve klachten en suïcidaliteit, jongeren waarbij sprake is van acute suïcidaliteit worden verwezen voor behandeling, en 2) het aanbieden van een CGT preventieprogramma aan jongeren met verhoogde depressieve klachten. Het unieke van deze aanpak is dat er wordt samengewerkt met veel verschillende partners en dat elke partner een taak heeft binnen de samenwerking. Zo is de GGD verantwoordelijk voor de screening; de psycholoog verbonden aan school samen met een andere hulpverlener (bijvoorbeeld vanuit het wijkteam) verzorgt het preventieprogramma binnen de school; de specialistische GGZ is verantwoordelijk voor kennisverspreiding, zoals het leren uitvragen van suïcidaliteit of het geven van een CGT training aan trainers; de universiteiten faciliteren in het onderzoek; en de gemeente ondersteunt in de financiering.

Overzicht proefschrift

Het doel van dit proefschrift was tweeledig. Ten eerste het onderzoeken van de risicofactoren coping en perfectionisme in relatie tot depressieve klachten en suïcidaliteit. Ten tweede het onderzoeken van de depressiepreventie aanpak STORM in de preventie van depressie en andere samenhangende klachten bij adolescenten op de middelbare school. Dit proefschrift levert daarmee een bijdrage aan kennis over risicofactoren, de werkzaamheid van STORM als depressiepreventie, en mogelijkheden voor implementatie van depressiepreventie.

De risicofactoren coping en perfectionisme zijn onderzocht in hoofdstuk 2 en 3. In hoofdstuk 2 zijn de relaties tussen verschillende coping strategieën en depressieve klachten over verloop van tijd onderzocht in een grote groep adolescenten tussen de 11 en 14 jaar. Uit de resultaten kwam naar voren dat geen van de coping strategieën voorspellend was voor het ontwikkelen van depressieve klachten. Wel bleek er sprake van een omgekeerde relatie. Wanneer adolescenten verhoogde depressieve klachten ervaarden, gebruikten zij minder probleem-oplossende vaardigheden om met stress om te gaan. Jongens gebruikten minder vermijdende strategieën om met stress om te gaan wanneer er sprake was van verhoogde depressieve klachten. Bij meisjes was er juist een toename in vermijdende- en afleidingzoekende strategieën bij verhoogde depressieve klachten. De bevindingen suggereren dat de mate waarin bepaalde coping

strategieën gebruikt worden niet samenhangt met de ontwikkeling van depressieve klachten maar dat klachten er juist voor zorgen dat strategieën die als adaptief gezien wordt, minder toegepast worden.

In hoofdstuk 3 hebben we verder onderzoek gedaan naar coping. In dit hoofdstuk onderzochten we de relatie tussen perfectionisme en suïcidaliteit in een algemene populatie adolescenten tussen de 12 en 15 jaar oud, en keken we of het hanteren van een adaptieve of maladaptieve coping invloed had op deze relatie. Maladaptieve coping strategieën zijn onder andere catastroferen of jezelf de schuld geven, strategieën waarvan onderzoek heeft laten zien dat ze op termijn samenhangen met een toename van stressklachten. Onder adaptieve coping vallen strategieën zoals actieve probleemoplossing of relativeren, die gerelateerd zijn aan een afname van stressklachten. De bevindingen laten zien dat hogere scores op perfectionisme samenhangen met hogere scores op suïcidaliteit. Deze relatie was sterker wanneer er daarbij sprake was van een maladaptieve coping stijl. Een verhoogde adaptieve coping stijl bleek niet voldoende om een buffer te vormen tussen perfectionisme en suïcidaliteit. De bevindingen laten zien dat perfectionisme mogelijk ongezonde gevolgen kan hebben, zoals het ontwikkelen van suïcidaliteit, en dat het belangrijker lijkt om maladaptieve strategieën af te leren dan adaptieve strategieën aan te leren.

De depressiepreventie aanpak STORM, gebaseerd op het collaborative care model, is besproken en onderzocht in de hoofdstukken 4, 5 en 6. In hoofdstuk 4 presenteerden we het studieprotocol dat de basis was voor de gerandomiseerde en gecontroleerde studie naar de effectiviteit van het, op de cognitieve gedragstherapie gebaseerde, depressiepreventie programma 'Op Volle Kracht 2.0'. In dit hoofdstuk wordt de procedure van screening besproken, hoe er om wordt gegaan met suïcidaliteit en hoe adolescenten met verhoogde klachten worden uitgenodigd om deel te nemen aan de studie. In hoofdstuk 5 presenteren we de resultaten van dit onderzoek. De 130 jongeren die wilden deelnemen werden op basis van toeval ingedeeld in één groep die de CBT groepstraining Op Volle Kracht 2.0 (N = 66) volgde, en één groep die psycho-educatie ontving in de vorm van informatie en tips over wat je kan doen als je somber bent (N = 64). In beide groepen vulden adolescenten en hun ouders vragenlijsten in over verschillende klachten tot twee jaar na de interventie. Uit de resultaten bleek dat in beide groepen de depressieve klachten afnamen, maar de afname in klachten één jaar na het volgen van een van de programma's, was sterker bij de jongeren die Op Volle Kracht 2.0 hadden gevolgd. Dit betekent dat Op Volle Kracht 2.0 effectief is in het verminderen van depressieve klachten bij jongeren en effectiever dan het aanbieden van psycho-educatie. Aanvullende analyses lieten zien dat 38.3% van de jongeren in de Op Volle Kracht 2.0 groep verbeterden wat betreft depressieve klachten, in de psycho-educatie groep was dit 12.5%. Het aantal jongeren dat verslechterden was 2.1%

in de Op Volle Kracht 2.0 groep en 8.3% in de psycho-educatiegroep. Er was geen verschil tussen de twee groepen in afname wat betreft depressieve klachten gerapporteerd door ouders. Ook was er geen duidelijk verschil in een vermindering wat betreft het vaststellen van een depressieve stoornis.

In hoofdstuk 6 hebben we het effect van Op Volle Kracht 2.0 verder onderzocht op klachten die vaak samenhangen met depressieve klachten. Dit waren angst, suïcidaliteit, somatische klachten en perfectionisme. Er was geen verschil in afname van suïcidaliteit, somatische klachten en perfectionisme tussen de twee groepen. Wel was er in beide groepen een duidelijke afname wat betreft angstklachten en deze afname was sterker in de groep die Op Volle Kracht 2.0 gevolgd had. Dit betekent dat het programma effectief is in het verminderen van angstklachten bij adolescenten die eveneens depressieve klachten ervaren. Een belangrijke bevinding, want de combinatie van beide klachten leidt vaak tot een slechtere prognose en vermindering van deze klachten is daardoor erg waardevol.

Naast de wetenschappelijke bevindingen leverde de ketensamenwerking ook direct resultaat op in de aanpak van suïcidaliteit. Door de actieve en systematische screening met stoornis specifieke vragenlijsten (te weten: CDI-2) werden 13 jongeren met hoge tot acute suïcidaliteit geïdentificeerd. Zij werden voor verdere hulpverlening verwezen of de aanwezige hulpverlening werd opgeschaald. Daarnaast lieten de cijfers in onze studie ook zien dat suïcidaliteit in duidelijke mate aanwezig was in deze doelgroep. Zo ervaarde 40% van de 130 adolescenten die in onze studie deelnamen suïcidale gedachten, rapporteerden 11 jongeren een suïcide poging in het verleden en werden we tijdens de nametingen geconfronteerd met twee suïcide pogingen, één in de Op Volle Kracht 2.0 groep en één in de psycho-educatie groep. Dit bevestigt dat suïcidaliteit in grote mate aanwezig is onder jongeren en dat het tijdig herkennen en het organiseren van zorg aandacht verdient.

Implicaties van de bevindingen

Concluderend hebben de bevindingen in dit proefschrift bijgedragen aan een verbeterde kennis over risicofactoren in de ontwikkeling van depressieve klachten en suïcidaliteit bij adolescenten. We hebben laten zien dat verschillende coping strategieën niet voorspellend zijn voor het ontwikkelen van depressieve klachten maar dat depressieve klachten er wel voor kunnen zorgen dat jongeren minder gebruik maken van probleem oplossende strategieën. Daarbij hebben we de schaduwkant van perfectionisme laten zien door aan te tonen dat een hoge mate van perfectionisme samenhangt met een hoge mate van suïcidaliteit bij jongeren, waarbij de aanwezigheid van sterke maladaptieve coping vaardigheden de relatie versterkte. Daarnaast hebben we aangetoond dat STORM effectief is in het verminderen van depressieve klachten bij jongeren, waarbij jongeren die Op Volle Kracht 2.0 volgden significant minder depressieve klachten ervaarden één jaar na

het volgen van de training dan jongeren die psycho-educatie ontvingen. Eveneens was Op Volle Kracht 2.0 effectiever dan psycho-educatie in het verminderen van angstklachten bij jongeren met verhoogde depressieve klachten.

Op basis van deze bevindingen kunnen er verschillende suggesties gedaan worden voor de klinische praktijk. Ten eerste is een actief screeningsbeleid op depressieve klachten en suïcidaliteit cruciaal. We hebben aangetoond dat het mogelijk is om jongeren met klachten in een vroeg stadium te identificeren en, zo nodig, te verwijzen voor verdere hulpverlening. Vervolgens is het van belang om een bewezen effectief preventieprogramma aan te bieden aan adolescenten met verhoogde depressieve klachten. Dit voorkomt dat adolescenten met onbehandelde klachten blijven rondlopen en verbetert daarmee de prognose op de lange termijn. Op Volle Kracht 2.0 heeft zijn effect bewezen als geïmplementeerd depressiepreventie programma en is daarmee, naar ons weten, op dit moment de beste keuze om depressiepreventie aan te bieden. Daarnaast is een samenwerkingsmodel volgens de principes van collaborative care, zoals STORM, fundamenteel voor het duurzaam implementeren en verbeteren van depressiepreventie. Op dit moment is er sprake van een hoge mate van fragmentatie binnen de (jeugd)zorg en een STORM aanpak gaat dit niet alleen tegen, maar laat ook op een unieke manier zien hoe een regionale samenwerking met een gedeelde visie efficiënt en zelfvoorzienend kan zijn in het organiseren en aanbieden van zorg. Dit proefschrift laat hiervan de mogelijkheden en resultaten zien, en de potentie voor implementatie op grote schaal.

Appendix

Dankwoord

Dankwoord

Wat was mijn promotietraject een mooi avontuur, ik had het voor geen goud willen missen en ben verschillende mensen dankbaar die direct of indirect hebben bijgedragen aan de totstandkoming van dit proefschrift.

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Appendix

Curriculum Vitae

Curriculum Vitae

Karlijn Heesen was born on January 14th 1990 in Nijmegen, the Netherlands. She attended secondary school from 2002 to 2007, at Stedelijk Gymnasium Nijmegen. In 2007 she started her training to hair- and make-up artist at ROC Rijnijssel Arnhem, which she completed in 2010. During this training she did several internship in hairdressings salons, television- and musical productions. From 2010 to 2011 she completed her first year's degree Pedagogy at HAN, Nijmegen. In 2011 she started her Bachelor Pedagogical Science at Radboud University Nijmegen. During her Bachelor she participated in the Honours programme. As part of this programme she did an internship at the Pediatric Intensive Care Unit of Radboud UMC, where she developed a flyer for aftercare. She did the research and writing for her Bachelor thesis at Arizona State University (USA). After finishing the Bachelor, she started the Master Pedagogical Science at Radboud University Nijmegen. She did her clinical internship at the mental health institute GGZ Oost Brabant in Oss. After graduation, she started her PhD-project (STORM). Besides her work as researcher, she had an important role as project manager in the implementation of STORM in the school- and youth care community. She combined her work for this research project with clinical work as a therapist, at GGZ Oost Brabant. Currently she works as a researcher at 113, the national suicide prevention organization in the Netherlands.

Appendix

Portfolio

Portfolio

Publications

De Jonge-Heesen, K.W.J., Rasing, S.P.A., Vermulst, A.A., Scholte, R.H., van Ettekoven, K.M., Engels, R.C.M.E, & Creemers, D.H.M. (2021). Secondary Outcomes of Implemented Depression Prevention in Adolescents: A Randomized Controlled Trial. *Frontiers in Psychiatry, 12*, 191. doi:10.3389/fpsyt.2021.643632

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Masterclass single case design , GGZ Oost Brabant (2017)
Clinical perfectionism, Cure and care development (2019)
Professionalism and integrity in research, Erasmus University Rotterdam (2021)

Professional education

MBCT/MBSR teacher, Radboud Center for Mindfulness (2017-2018)

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Awards

Jan Mokkenstorm award by 113 suicideprevention and Suicide Research the Netherlands (SURE-Net) for the clinical impact of the publication 'Randomized control trial testing the effectiveness of implemented depression prevention in high-risk adolescents' (2020).